ICI Magazine

APRIL 1960

The *I.C.I. Magazine*, price twopence, is published for the interest of all who work in I.C.I., and its contents are contributed largely by people in I.C.I. Edited by Sir Richard Keane, Bt., and printed at The Kynoch Press, Birmingham, it is published every month by Imperial Chemical Industries Limited, Imperial Chemical House, Millbank, London, S.W.1 (Phone: VICtoria 4444). The editor is glad to consider articles and photographs for publication, and payment will be made for those accepted.

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Contents

FRONT COVER: *All Souls College, Oxford, by Mr. B. Pocock (Southern Region)* *(Kodachrome, 1/15 sec. at F.8)*

POINT of VIEW

THE COST OF PROGRESS

by Mark Abrams

A FEW years ago a highly intelligent and cautious Cabinet Minister assured the British electorate that our average standard of living could be doubled in 25 years. Naturally his political opponents denounced this as complacency and his colleagues praised his sensible optimism. But as far as I can remember no one asked him to explain how this progress would be brought about. This silence is all the more remarkable since the forecast was made at a time when we had no reserves of unemployed labour or of idle industrial plant to draw on. But if Mr. Butler had been questioned about this prediction he might well have justified it by pointing to two comparatively new features of British industry—a greater readiness on the part of industry to use its profits for investing in expansion, and secondly a new awareness by government and industry of the importance of organised innovation. And of the two the latter is probably the more important as a basis for future prosperity.

What is meant by innovation? Briefly, it is the discovery and development of new or better processes and products. From the beginning of the industrial revolution until a generation ago innovation of this kind—at least in Britain—was almost entirely dependent on haphazard individual initiative. Then in the early 1930s a handful of far-seeing businessmen, politicians, civil servants and academic teachers effected a silent revolution. They realised that in a highly industrialised and urbanised nation any striking advances in material prosperity and improvements in national military strength could be achieved only if large resources were set aside for the specific job of innovation.

Between 1930 and 1938 expenditure in this country on such research and development doubled; between 1938 and 1950 it doubled again; and in the past ten years there has been a further increase of at least 50%, so that by the end of the 1950s our total annual spending on organised innovation was roughly £430 million. That is a very sizeable figure by anyone's standards; it is equivalent to a yearly payment of £25 by every family in Great Britain, or more than 2% of the average family's income. Certainly this is a lot of money; but probably it is about right if we are to double the standard of living over the next 25 years.

If that is so, and if we want this doubling of living standards, clearly the most important economic task facing Britain now is to ensure that we maintain our present level of spending on research and development. And it is on this point that we are reasonably entitled to be worried. In recent years much spending has been made possible by government funds and by government departments primarily concerned with research for national defence. The latest estimates indicate that today of the £430 million of total research and development only two-thirds was carried out by private industry; and not all this was *financed* by private industry—about 30% has been paid for through government contracts with aircraft and electronics firms. This government spending on research and development which helps industrial innovation is no longer expanding: indeed, it looks as if it may decline sharply. In the light of this development there is one overriding issue for those who want a higher standard of living for everyone and who believe that State action can help to bring this about: the government must encourage and help to pay for more research and development of value to industry. £200 million a year spent by the government on this will achieve a great deal more than any conceivable amount of thought and money spent on nationalisation and denationalisation, tariff reductions, food subsidies, the direction of industry away from the Midlands, and similar policies which currently seem to take up most of the time of politicians when they discuss economic affairs.

The opinions expressed in this article are not necessarily those of the Company

I.C.I. PIONEERS

FIRST LARGE-SCALE PRODUCTION OF

Beryllium for Atomic Energy

Contributed by Metals Division

At Witton, Birmingham, I.C.I. have erected a £1m. plant to make seven tons a year of a rare metal. Yet even this small output ranks as large-scale production, so costly and difficult is the metal to work. Beryllium—the object of this expensive outlay—is demanded by atomic energy authorities for the better sheathing of uranium in gas-cooled reactors.

"The Men in White Suits"—"£1,000,000 City Plant"—"Safety Clothing for Factory Staff." These were some of the phrases used by editors to headline newspaper reports featuring Metals Division's newest production unit, the Beryllium Plant at Witton.

Men in white suits and safety clothing are not, of course, rare in industry today, and £1,000,000 plants are by some standards quite modest. Why, then, did this particular story make news?

The answer is that the conditions in this plant, though familiar enough in atomic energy establishments (and in I.C.I. Pharmaceuticals Division), are very exceptional in the setting of the non-ferrous metal industry. They are dictated by the special characteristics—and in particular the toxic hazards—of this particular metal.

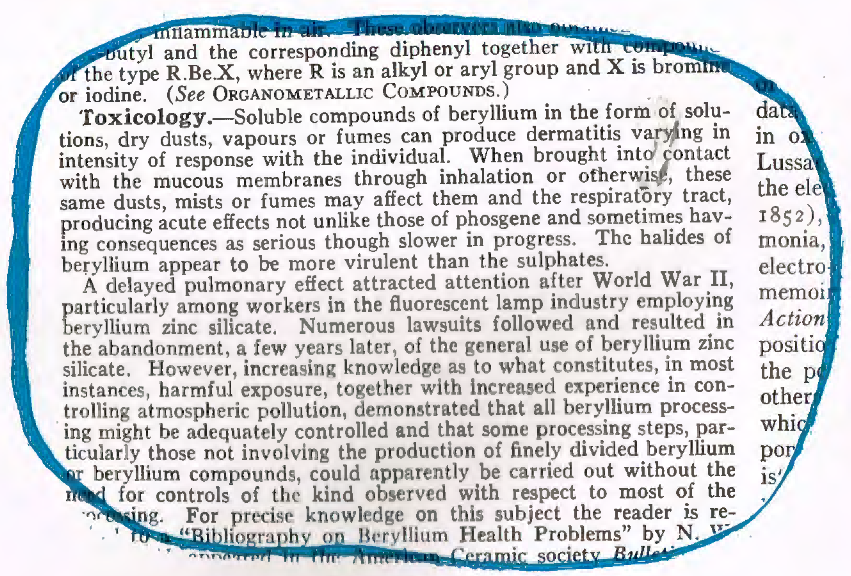
Let us make the acquaintance of beryllium and see what lies behind its birth as a structural material.

Unlike titanium, which was the first of the "new metals," natural beryllium is quite a scarce commodity—there is, for instance, only one-seventh as much beryllium in the earth's surface as there is tin. It is never found in deep seams, but "occurs," as the experts say, in scattered pockets of ore, the semi-precious stone beryl. Each lump of beryl yields only about 3% of metallic beryllium. Crystals have to be hand sorted, and the extraction process is costly and laborious, involving three separate chemical reactions.

Raw beryllium reaches the metal manufacturer in the form of flake or pebbles, and the business of converting this into usable forms, such as tubes or rods, is as tedious and expensive as the extraction process.

There are two complicating factors.

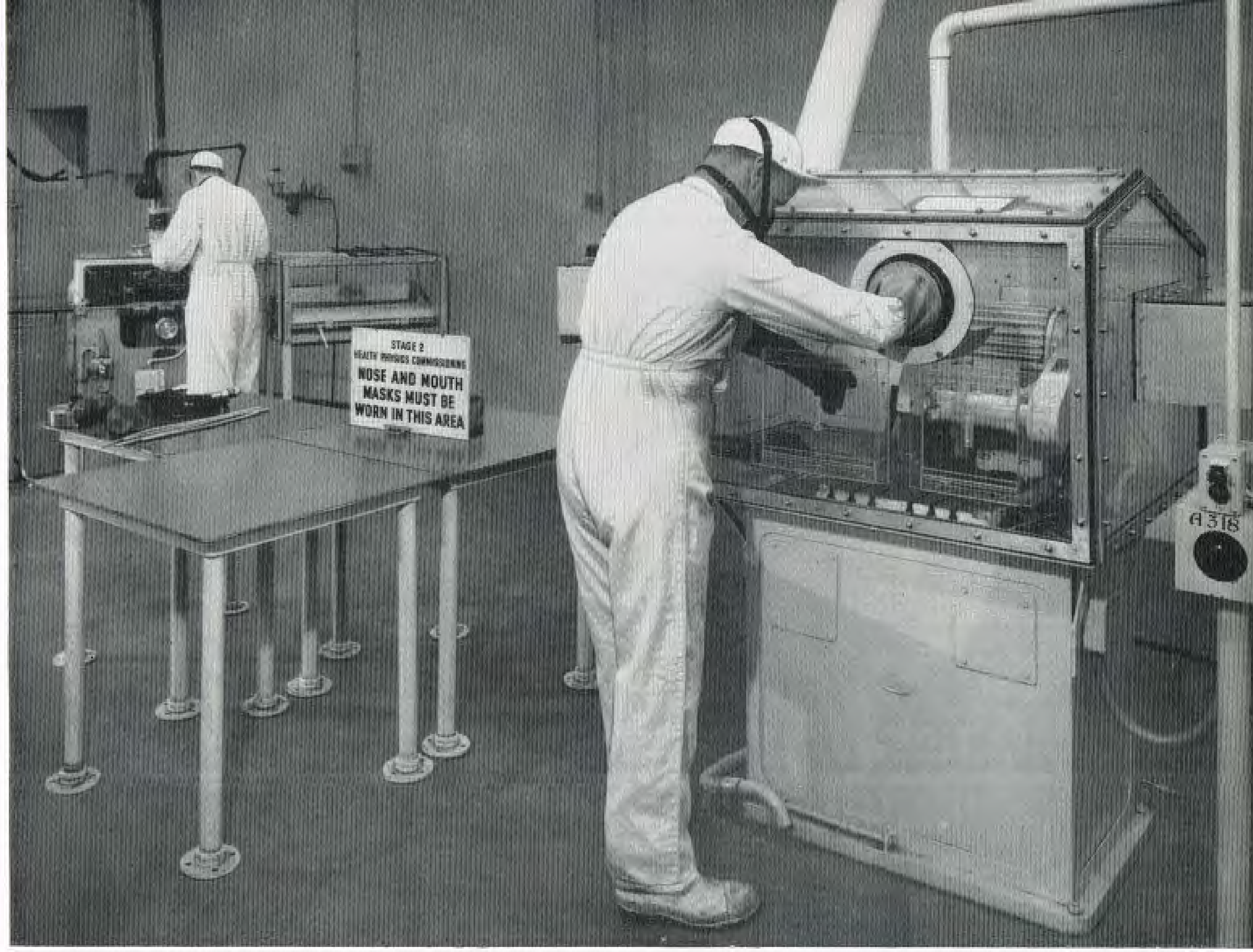
First, the properties of the wrought metal are impaired by impurities present in the raw material. So


...inflammable in air. These observers also ...
...butyl and the corresponding diphenyl together with compounds of the type R.Be.X, where R is an alkyl or aryl group and X is bromine or iodine. (*See* Organometallic Compounds.)

Toxicology.—Soluble compounds of beryllium in the form of solutions, dry dusts, vapours or fumes can produce dermatitis varying in intensity of response with the individual. When brought into contact with the mucous membranes through inhalation or otherwise, these same dusts, mists or fumes may affect them and the respiratory tract, producing acute effects not unlike those of phosgene and sometimes having consequences as serious though slower in progress. The halides of beryllium appear to be more virulent than the sulphates.

A delayed pulmonary effect attracted attention after World War II, particularly among workers in the fluorescent lamp industry employing beryllium zinc silicate. Numerous lawsuits followed and resulted in the abandonment, a few years later, of the general use of beryllium zinc silicate. However, increasing knowledge as to what constitutes, in most instances, harmful exposure, together with increased experience in controlling atmospheric pollution, demonstrated that all beryllium processing might be adequately controlled and that some processing steps, particularly those not involving the production of finely divided beryllium or beryllium compounds, could apparently be carried out without the need for controls of the kind observed with respect to most of the processing. For precise knowledge on this subject the reader is referred to a "Bibliography on Beryllium Health Problems" by N. W... appeared in the American Ceramic society *Bulletin*...

An extract from Chambers' Encyclopedia



Beryllium being cut to length by a machine completely enclosed in a glove box. Workers are thus fully protected from the toxic dust of the metal. These masks would not normally be worn here, but extra precautions are taken while the machines are being run in.

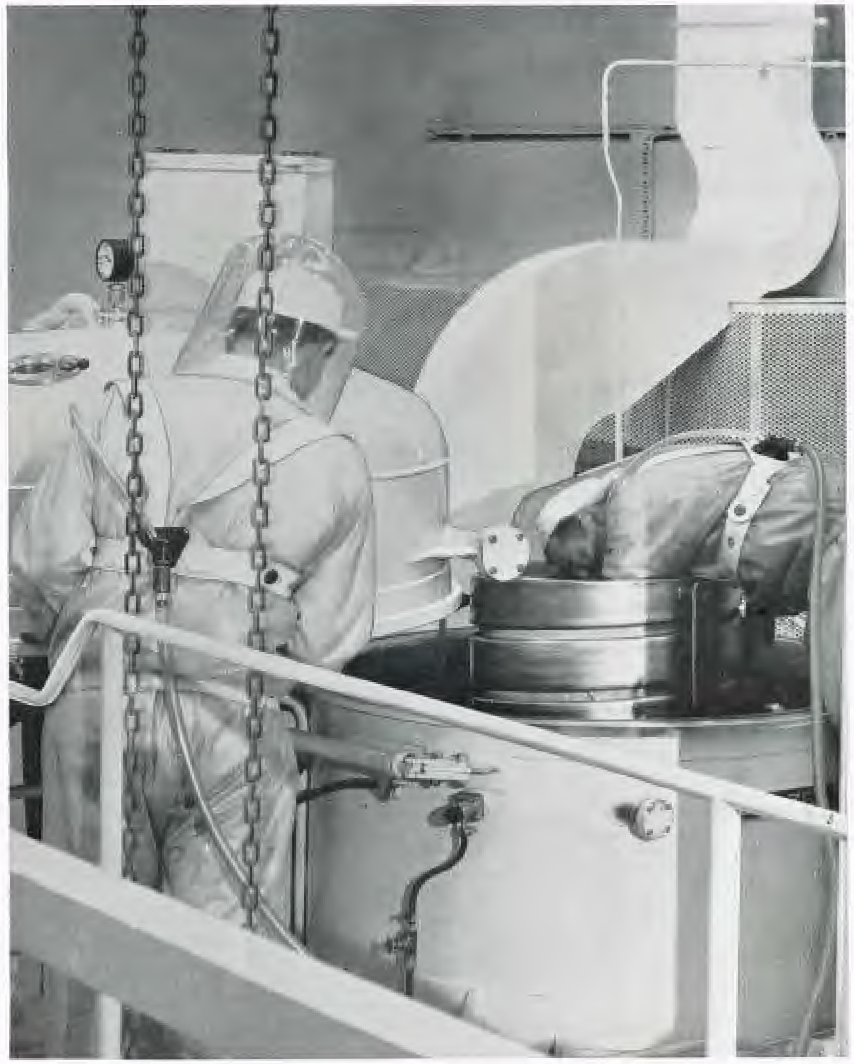
an essential preliminary is to refine the raw beryllium, this being done by melting it in a vacuum induction furnace. But the properties of components fabricated directly from ingot are unsatisfactory, so powder metallurgy techniques have to be used. The cast ingot is machined to chips, these in turn are ground to fine powder, and the beryllium powder is reconverted into solid metal by consolidation in a high-temperature sintering furnace, again under vacuum.

The second unusual feature of beryllium is even more of a headache. Early experience in the U.S.A. showed that powdered beryllium can have a toxic effect if absorbed into the lungs in excessive amounts, so elaborate precautions have to be taken at all stages of processing to ensure that workers do not inhale air contaminated with beryllium dust.

It is obvious enough, then, that something very special in metal-producing plants is needed for beryllium. And although considerable knowledge of plant design has been built up by the U.K. Atomic Energy Authority, a big effort was required to translate this, in a reasonably short time, into terms of commercial-scale production. That is why I.C.I. needed plant and equipment worth £1,000,000 to produce 7 tons of metal a year.

All this naturally prompts the question whether the whole thing is worth while. What is there about beryllium which justifies such an exacting and costly production effort?

The key lies in the insatiable appetite of the nuclear engineers for metals with uncommon and hitherto unwanted properties. No nuclear reactor can function safely and efficiently unless the metals used for various components fulfil the very exacting demands of the



Furnace maintenance. When the furnaces are cleaned and inspected, workers are completely protected by special clothing resembling space suits.

nuclear engineer. This is particularly true of metals used for fuel cans (the sheaths surrounding the nuclear fuel), which must have no fewer than four qualifications for the job. In all reactor operating conditions the can must safely contain the fuel and dangerous radioactive fission products; be unaffected by either the fuel or the coolant; be as "transparent" as possible to neutrons, the life-blood of the reactor; and allow efficient transfer of heat to the coolant.

The choice of metal will depend on many factors, including the nature of the coolant (which may be carbon dioxide, water or liquid metal) and the operating temperature. In gas-cooled reactors of the Calder Hall generation, cans made of special magnesium alloys do all that is required of them. But the next step in improving the efficiency of gas-cooled reactors (and in producing cheaper power) involves operating at much higher temperatures—perhaps up to 600° C. against the 450–470° C. of current gas-cooled reactors. At these temperatures magnesium alloys are unsuitable, so a metal was needed which not only had all the useful properties of magnesium alloys but retained them at much higher temperatures. Of all the metals evaluated, beryllium was much the most promising. Light and strong, this metal has excellent resistance to carbon dioxide and absorbs even fewer neutrons than magnesium does. So the U.K.A.E.A. specified this metal for fuel sheathing in its experimental advanced gas-cooled reactor.

I.C.I.'s Mandate

I.C.I. Metals Division—whose special aptitude for handling nuclear metals has been recognised since the earliest days of atomic power—was entrusted with the task of producing the wrought beryllium for these cans. In the late summer of 1958 it embarked on the construction of the first plant in Europe to be designed for processing large quantities of beryllium from raw material to wrought product. Less than eighteen months later the plant is in full-scale operation, producing beryllium tubes and rods for the U.K.A.E.A.

That is the story up to date, but a glimpse into the future is not irrelevant. Beryllium has so far been developed solely for its nuclear properties. But, once it is available commercially, it would be surprising if its extremely high strength-to-weight ratio did not lead to applications in other fields of engineering. Even unalloyed, beryllium is almost as strong as mild steel, yet it is only about a quarter its weight. These properties have already aroused considerable interest among aircraft manufacturers, and the metal is a possibility also for such items as shutters on high-speed cameras, where the importance of weight-saving outweighs the disadvantage of high initial cost of material.

Now let us take a look at the plant. The fact that dust control is an overriding consideration is obvious even from the outside. In marked contrast to the lavishly glazed monsters beloved of modern industrial

(*Continued on page* 141)

Inside this box ingots of beryllium are reduced to chips by a swarfing lathe operated from the outside. **The control laboratories** (below). High purity of both raw material and metal is ensured during processing by frequent analysis and radiography.

FAMILY PORTRAITS

2—The Hale family of General Chemicals Division

When Hamilton Castner, the American chemist, arrived in Oldbury to supervise the building of his new factory there, he found temporary lodgings with Mrs. Hannah Hale, the charming old lady whose picture appears at the top of the page. That was in 1887. The factory was duly completed, and Mrs. Hale, the bread-winner of the family since her husband was blinded in a mining accident, was engaged first as cook to the staff and later as housekeeper to Castner himself.

Hannah worked for Castner for only a year or so. Then her daughter, Phoebe Hale, took over and remained as housekeeper for eight years until the exodus to Castner's new works at Runcorn. During that time she married Mr. Thomas Holloway, and among their wedding presents was a dinner, tea and coffee service from Castner made entirely of crown metal, an alloy containing Castner aluminium, which is today one of the family's treasured heirlooms.

In 1892 Thomas also started to work for the Aluminium Company at Oldbury. By that time Castner was already busy working on his famous rocking cell for the manufacture of caustic soda and chlorine, and it is proof of the trust in which Thomas was held by Castner that in 1895 he went to Germany to assist in erecting the first rocking cells on the Continent at Solvay's Osternienburg plant. Thomas eventually retired in 1932.

Thomas and Phoebe had four sons. Bill, the eldest, retired last year after 48 years' service. He trained as a fitter and was loaned before the war to Canadian Industries Ltd. to help erect a chlorine plant at their new works at Cornwall, Ontario. Tom junior, a chemist, retired last month after nearly 48 years with the Company. Alf, a foreman electrician with the Division Power Department, has 37 years to his credit. The third son, Jim, also worked at Castner's before emigrating to South Africa.

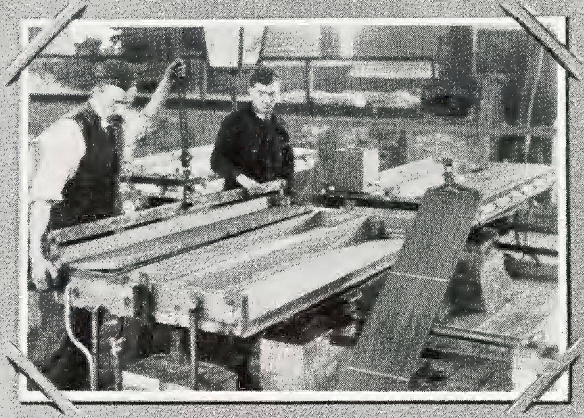
Mr. Bill Holloway has two daughters. Lily, the elder, worked at Castner's before she was married. Doreen is a clerk at Rocksavage Works.

Two of Mrs. Hannah Hale's sons also joined the Aluminium Company, and her children, grandchildren and great-grandchild on this side of the family have a record of service nearly equal to the Holloways. Jim and Sam Hale, Phoebe's brothers, were, like her husband Thomas, among the first employees at the new Castner-Kellner factory at Runcorn, and Sam's children followed their father. Joe, with 39 years' service, is at Castner-Kellner Works, and Will, with 33 years, is with the Division Distribution Department. A third son, Sam, who died in 1950, completed 31 years with the Company. Of the two daughters, Annie spent some years with the Salt Division at Weston Point, and Matilda, who died in 1953, spent 11 years at Castner-Kellner Works. Nineteen-year-old Jane, Will's daughter, who works in the Division Supply Centre, is the youngest of Hannah Hale's descendants working for I.C.I.

Another of Hannah's daughters, Mary, also married an Aluminium Company man, Mr. Joe Briggs. Three of their sons worked at Castner's too. Arthur Briggs was a foreman on the peroxide plant. He retired in 1945 and is the oldest living descendant of old Mrs. Hale. Fred, the second son, was foreman on the liquid chlorine plant, and Melzar was a shift electrician. A daughter married Mr. William Whitlow, who eventually became cashier at Salt Division's Weston Point Works, and two of their sons work for General Chemicals Division. Fred Whitlow is at Wade Works and Frank is in the Division Power Department.

Altogether the family association now mounts up to something in the region of 500 years' service, and seven of Hannah Hale's descendants are still with the Company and adding to the total every year.

Some of the original workers of the Castner-Kellner Alkali Co. The group includes Jim Hale (standing, extreme left), Thomas Holloway (front row, right) and Thomas's brother, George (middle row, extreme right)



At work on one of the first Castner rocking cells at Oldbury. Thomas Holloway is on the right

Miss Phoebe Hale, Hannah's daughter

At Mr. Bill Holloway's retirement ceremony. With Bill (centre front) are his brothers Alf (left) and Tom

Mr. Arthur Briggs, oldest surviving descendant of Hannah Hale

Miss Jane Hale, the youngest of the family working for I.C.I.

THE FERTILIZERS ENQUIRY

By Donald Haffenden

A clean bill of health was given to I.C.I. by the Monopolies Commission's Report on fertilizers which noted that the Company "has shown a conscious regard for public interest" in the development and conduct of its fertilizer business. This conclusion was reached after a most laborious investigation, involving among other things the submission of 6000 pages of written evidence by I.C.I. and work costing the Company tens of thousands of pounds.

"No news is good news," and so it was for I.C.I. when the national daily newspapers of Wednesday, 17th February, reported the findings of the Monopolies Commission following their enquiry into the supply of chemical fertilizers. Although all the papers gave some space to these findings, many of them did not even mention that I.C.I. had been involved in the Enquiry. Why was this, and what in fact did the Commission have to say about the Company?

Before answering these questions, let me mention the salient features of the Enquiry and give some indication of the measure of work imposed by it on the Company.

Meaning of Monopoly

The Enquiry covered the supply in the United Kingdom of five different classes of chemical fertilizers, and the first duty of the Commission was to determine whether any single firm supplied more than one-third of any of these kinds of fertilizers. Any firm found to be in this position was a "monopoly supplier," and, as was expected, I.C.I. was found to be the monopoly supplier of nitrogenous fertilizers. On the other hand, Scottish Agricultural Industries Ltd., a subsidiary company of I.C.I., who were suppliers of four of the five classes of fertilizers, were not found to be "monopoly suppliers" of any one of them. The second, more important, duty of the Commission was to decide whether the things done by the monopoly suppliers in the conduct of their fertilizer business "operate or may be expected to operate against the public interest." Summed up in these few short sentences, the task may not seem to have been a difficult one, and it might well be asked why it took almost four years to complete.

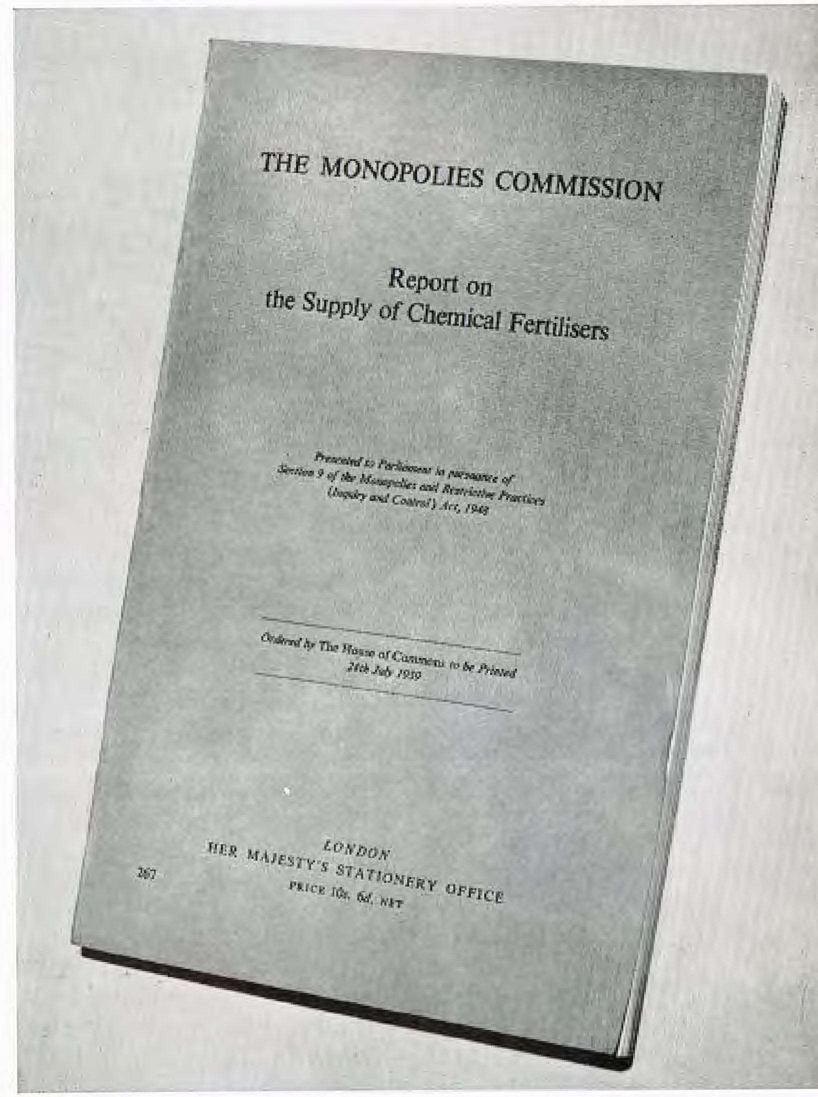
I can only speak about the effort called for within the Company and S.A.I., but the experiences of other firms concerned were no doubt similar. I.C.I. and S.A.I. between them submitted written evidence amounting to some 6000 pages and attended oral hearings, the proceedings of which accounted for another 350 pages. The Commission and their staff paid visits to Billingham Factory and Jealott's Hill Research Station, and were shown I.C.I. films about the manufacture and use of fertilizers. The Commission's staff spent long periods investigating the I.C.I. and S.A.I. accounts and in reading Board and other minutes. Several members of I.C.I. and S.A.I. staff were employed whole-time on the Enquiry, and others had to spend a great deal of time studying the past history of the business in preparing for the all-important oral hearings at which the Company's policies and actions were questioned. The cost to the Company of all this was tens of thousands of pounds.

Unequivocal Finding

Opinions may differ on the proper answer to the question "Was it all worth it?"; but the outcome, from the point of view of the conclusions arrived at by the Commission, was entirely satisfactory to I.C.I. Far from condemning the Company in any respect, the Commission gave it a clean bill of health. They stated, unequivocally: "*Our general conclusion, then, is that neither I.C.I.'s monopoly in nitrogenous fertilizers nor its actions as a monopoly supplier operate or may be expected to operate against the public interest.*" This finding that I.C.I. was free from any blame was expressed in negative terms, but, as though to remove all doubt and to make certainty doubly sure, the Commission added: "*We think it right to say that in our opinion I.C.I., in the development and conduct of its fertilizer business, has shown a conscious regard for the public interest.*"

Although, within the Company, there had been no doubts about the propriety of our actions over the years, this positive comment, coming from a critical body (whose duty and procedure are essentially designed to expose faults), was praise indeed. It was also rewarding in that it acknowledged the efforts made to build up an efficient and progressive fertilizer industry over the years, during many of which, as the Commission noted, the business was unprofitable.

These were the general conclusions, but other comments on particular matters are also worthy of note. One of the important questions in any Enquiry is whether a "monopoly supplier" has deliberately sought this position and, having achieved it, proceeds to abuse the power which that position affords. In this connection the Commission accepted the Company's view that its leading position was the historical consequence of the initiative taken in 1920 by Brunner, Mond & Co. Ltd., which alone was prepared to accept the serious risk involved in establishing the new and strategically vital synthetic nitrogen industry. The Commission commented that any company which had the enterprise to enter and develop this field forty years ago and which survived the early difficulties would naturally be in a strong position.



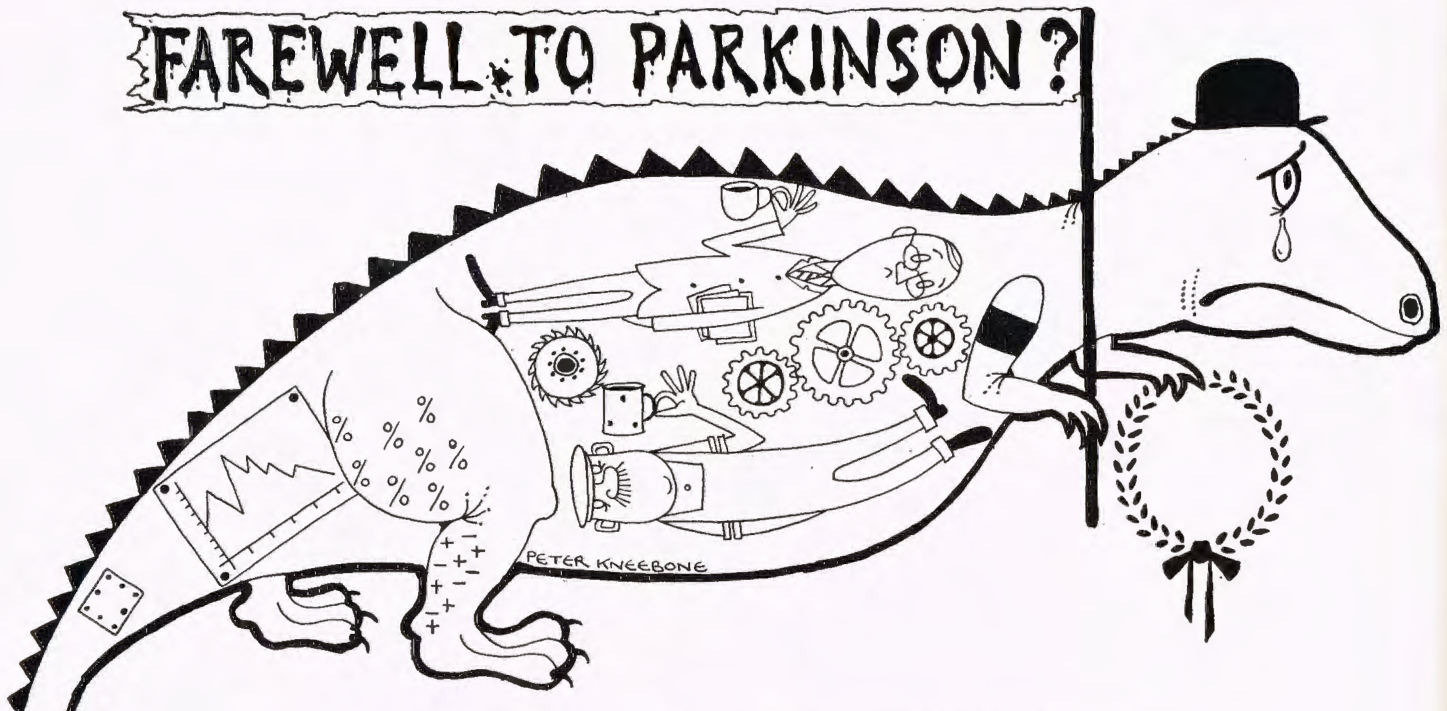
Technical Service Praised

As was to be expected, attention was paid to the views expressed by users of fertilizers and others, such as farmers, agricultural colleges, distributors and Government Departments. A whole chapter of the Report was devoted to their observations, and, apart from sundry references to temporary shortages of certain popular fertilizers, like I.C.I.'s 'Nitro-Chalk' and C.C.F., there was little complaint. On the contrary, many referred to the excellent technical service which I.C.I. and other companies had provided, and the Commission, in their conclusions, remarked that "the high value of the services rendered to the agricultural industry by I.C.I. is not open to doubt. Its contributions to progress in farming technique, through education, through the study of crops, soils and methods of applying fertilizers, and through original research are universally acknowledged, and have . . . led to a more informed as well as an increased use of fertilizers, with great advantage to agriculture by way of higher productivity." This must provide a great fillip to those who are carrying on the work of increasing nitrogen usage.

It would be tedious to recount each aspect dealt with in the Report, but the important questions of prices and profits should be mentioned. In relation to each of these the Commission approved of I.C.I.'s activities. They were satisfied that "I.C.I.'s prices have so far been reasonable" and that for sulphate of ammonia, the main product concerned, "there is no substance in the suggestion that I.C.I.'s home price is high by comparison with prices abroad." On profits they concluded that the levels had so far been reasonable and added that "there is certainly no evidence that I.C.I. is anything but an efficient producer."

There is no gainsaying that the Commission found that the chemical industry—and I.C.I. in particular—has served agriculture and the country well. This is the conclusion of an impartial body which, for several years, probed every detail and laid bare all the facts concerning the industry (which has sometimes been misunderstood and even misrepresented). It is therefore gratifying that such a body demonstrated so conclusively that private industry—and so-called "big business" in particular—does in fact show a proper sense of responsibility towards its customers and towards the interests of the community.

FAREWELL TO PARKINSON?



By James Taylor (Group Director for Nobel and Metals Divisions)

Parkinson's Law is today almost as well known as the seventh commandment. But, unlike that commandment, it is rarely broken. Dr. James Taylor here discusses how to arrest the phenomenon of growth of staff regardless of the growth of basic activities.

When Professor Parkinson, through the medium of *The Economist*, "first revealed to mankind" his now famous law, the business community was highly amused at the prime joke that had been perpetrated on "officials." It didn't apply to them: like George Robey, they held that vulgarity is the behaviour of others. Nemesis, in the form of competition, soon overtook them, however, and many industries have been forced to make an agonising reappraisal of their own activities with the object of becoming what Frank Magee, president of ALCOA, called lean and tough outfits. It is to be hoped that the recent recovery in the trading position will not stifle such salutory exercises at birth.

What Parkinson brought out so clearly is that unless deliberately checked there is an almost inevitable growth in staff as the years go by and that this increase bears little or no relation to the size of the basic activities of an organisation. "Work expands so as to fill the time available for its completion," and this growth factor applies to the business world no less than to Whitehall. There is no doubt that a grievous burden of overheads afflicts modern industry. It is a form of inflation, the logical sequence of "you've never had it so good"!

Industrial costs comprise direct plant costs of manufacture and also all ancillary expenditures, including those classed as overheads. Research, Development, Technical, Engineering, Commercial, Accountancy, Personnel, Sales and Advertising Departments may be essential components of a modern industrial concern; but they are still additional to the actual manufacturing operations, and their cost must be borne by the product. There is no doubt that George, who runs the plant, feels like Sisyphus that "they" comprise a pretty big stone for him to push up the hill. George has a simple philosophy: he believes that we are in industry to make a profit, and he wants to know how "they" contribute to it. His sympathy is with Mr. Tait, who said: "This is a non-profit-making organisation—it wasn't intended to be, but that's the way things turned out."

George, of course, is misguided and wrong when he suggests that "they" are unnecessary or that they have cushy jobs. "They" are not idle; indeed, many are overworked, conscientious people trying to do a job of work; but the more they believe in their work the more is their urge to expansion. They have no yardstick to judge whether what they are doing is worth while. It is for higher management to provide such a yardstick.

Not long ago I was discussing industrial efficiency with some friends, and one of them remarked: "In the old company every man did the work of three." Immediately another colleague replied: "Yes, Jack; but was the work really necessary?" This provides the yardstick and a clue as to how to put Parkinson's law in reverse. In the ultimate, everything is measured in terms of human effort. The criterion of manufacture is the number of tons produced per man-£*.

There has been a view in the post-war period that an industry can maintain its position and absorb high overheads and ancillary expenditure by technical efficiency and technical innovation that stem from the deployment of a massive technical effort. Employment of people and resources in such a fashion and on such a scale was necessary for rehabilitation and re-equipment immediately after the war, and the post-war boom permitted adequate margins to pay for such activities. The philosophy that "anything I can do, science can do better" has been widely accepted without further examination.

Dinosaur's Example

When the big hole created by the war was filled, conditions changed. Industries which are in an expanding field, such as certain parts of the chemical industry, can still afford to mount large technical efforts and absorb their overheads by increasing turnover and diversification, but there are other industries in which existing capacity is greatly in excess of national requirements; some that have worked at full capacity for years will have to learn to break even at little more than half "occupacity" if they are to survive. Philosophers in these industries have resuscitated the cult of size and believe that they must grow into large units, whether by expansion or merging, or perish. There is much merit in this belief, but it is salutory to recall the dinosaur, which was, like modern industry, extremely large, with many teeth and a huge tail, and even possessed two brains (one at the front and one at the back). Evidently it is possible to have too many teeth and too large a tail!

Overheads under Scrutiny

At certain stages of development in a business it is difficult, if not impossible, to make major savings in costs, compared with competitors, by technical improvements to product and process. Some industries are in the position where the cost of maintaining specialist teams over long periods is greater than the savings that they can possibly make: after all, if you save George a penny a pound on the plant cost of his product by your efforts and charge him threepence a pound for doing it, it is hardly surprising if he shouts his head off. In these industries the only large slice of expenditure left on which savings and economies can be made is that of overheads and ancillary expenditure. In some cases overheads expenditure is actually of the same order as the plant cost, and therefore offers considerable scope for savings.

The vet will have to be called in to dock the poor old dinosaur's tail, and if he removes an odd tooth or two during his visit it probably won't do any harm. But how can he bring this about and put Parkinson's law in reverse? We must determine what is really necessary for the efficient conduct of the business and what is superflous and redundant. This is not as easy as it sounds. George's view is much too simple when he believes that it is only the manufacturing process that matters: it is no use producing products cheaply in the plant if they cannot be sold. But there is real room for the use of scientific methods analogous to those which have proved so successful in studying manufacturing processes and plant. These methods have been effective in reducing the numbers of operatives on production, sometimes in a spectacular way. It is not unreasonable to suppose that applied to overheads they might also result in substantial reductions in personnel. What is sauce for the goose ought to be sauce for the gander; and it should be just as profitable to carry out research on overheads as on production and technology.

To determine what work is essential and the number of personnel required to carry it out is not a task which can be left to the departments themselves, for hara-kiri is not popular among Western nations.

If such an investigation needs to be undertaken—and it most certainly does—it would be wise to use investigating teams who are experienced in the application of general scientific methods, such as work study and the analysis of requirements. Preferably teams should be neutral, but often it is advantageous for the departments concerned to participate themselves, even though it may mean attending their own funerals. These teams should submit their reports and recommendations to senior management. It is the job of the men at the top to make policy decisions and see they are carried out—a pretty tough assignment for top management, but that's what they are paid for.

New Approach Needed

A special class of overheads are those departments such as research and development and work study which are ancillary to the basic manufacturing processes, but which are undertaken with the avowed object of increasing the profitability of the industry either in the short or long term. In this case there is a certain amount of poetic justice in submitting the results to the acid test: it is not faith but good works that are needed.

The normal method of allocating such expenditure is to charge it to the product; if the expenditure was not incurred it would, other things being equal, release an equal amount of cash as profit. This, obviously, could be put to other uses, for example to reserves, to investments or to building production plants, thereby avoiding or reducing the industry's demand on the market for capital. It might even be of interest to the shareholders as dividends! Such expenditure must therefore be regarded as competing with other forms of investment for the funds available. Since it is made deliberately in order to obtain financial return, we ought fairly to be able to expect at least as good a return in the aggregate as that which would be obtained if the money was invested in other ways. This approach represents a radical departure from the usual procedure in most companies, but it throws a considerable amount of light on the return which ought to be achieved to justify maintaining large specialist teams over long periods of time. One has no objection to casting one's bread upon the waters, providing there is a sporting chance of it returning after many days.

These are a few thoughts on an approach to the grievous burden of overheads which afflict modern industry and to the seemingly impossible task of putting Parkinson's law in reverse. You may not believe in such an approach, taking the view that here, as in the field of political aberration, there is no type at once so futile and dangerous as the arrogant simplifier. In that case I won't confuse you with any more facts, but ask you to reflect again on the dinosaur.

*The unit must be "a man-£" and not "a man," since different categories are paid at different rates. It is also derived from the total number of people engaged on the project and not just the direct manufacturing force.

Modern Marvels—25

THE BLAST FURNACE

By G. Nonhebel

Blast furnaces are taken almost for granted these days. Yet they are the foundation upon which the steel industry is built. Modern blast furnaces have ten times the efficiency of the earliest types, and further improvements may be round the corner.

Most of the previous articles in this series have described equipment in which very recent scientific discoveries have been applied. The blast furnace, however, has been known for over a thousand years, and its claim to be included in this series lies in the size and efficiency of the large units employed for extracting iron from iron ore.

The earliest blast furnaces were somewhat like those that are still used in primitive parts of Africa: they consist of small clay shafts built up a bank and blown by means of goatskin bellows. Charcoal is used as the fuel. Application of new scientific knowledge as it became available has enabled man to build huge furnaces which, compared with the earliest types, produce ten times as much iron for the same weight of fuel. Also the iron produced is better in quality, even though much poorer grades of iron have now to be used in many of our furnaces.

Let us examine the improvements which have been made during the last two and a half centuries. The first and largest change was made by Abraham Darby in 1709, when he found out how to use coke in place of charcoal. Without this discovery the world would not have been able to produce the several hundreds of millions of tons of steel now consumed. As a consequence, ironmaking moved from counties such as Sussex, where there were plenty of trees for charcoal, to near the coalfields.

In a blast furnace the ore, which is impure iron oxide, is converted to crude iron by removing the combined oxygen. This is done partly by direct chemical reaction between the fuel and the ore and partly by the gas which is formed when air is blown through a bed of coke in a confined space. The gas which is thus produced is known as "blast furnace" gas, and its combustible constituent is the poisonous gas carbon monoxide; the rest of blast furnace gas consists of the normal product of combustion known as carbon dioxide mixed with the nitrogen in the air.

Air itself, it will be remembered, consists of 21% oxygen and 79% nitrogen; all the oxygen in the air blast is used up, part being converted to carbon dioxide and part to carbon monoxide. The gas leaving the top of a blast furnace still contains some combustible carbon monoxide, but although it has a heating power less than one-quarter that of town gas, it is worth collecting for use in steelworks as the quantity produced is enormous: in fact, half the coke charged into the furnace is converted into this combustible gas.

In the early blast furnaces all this combustible gas went to waste, and an early improvement was the invention of a double bell sealing system at the top of the blast furnace which enabled the gas to be collected while still allowing the fuel/ore mixture to be charged into the top of the furnace at intervals.

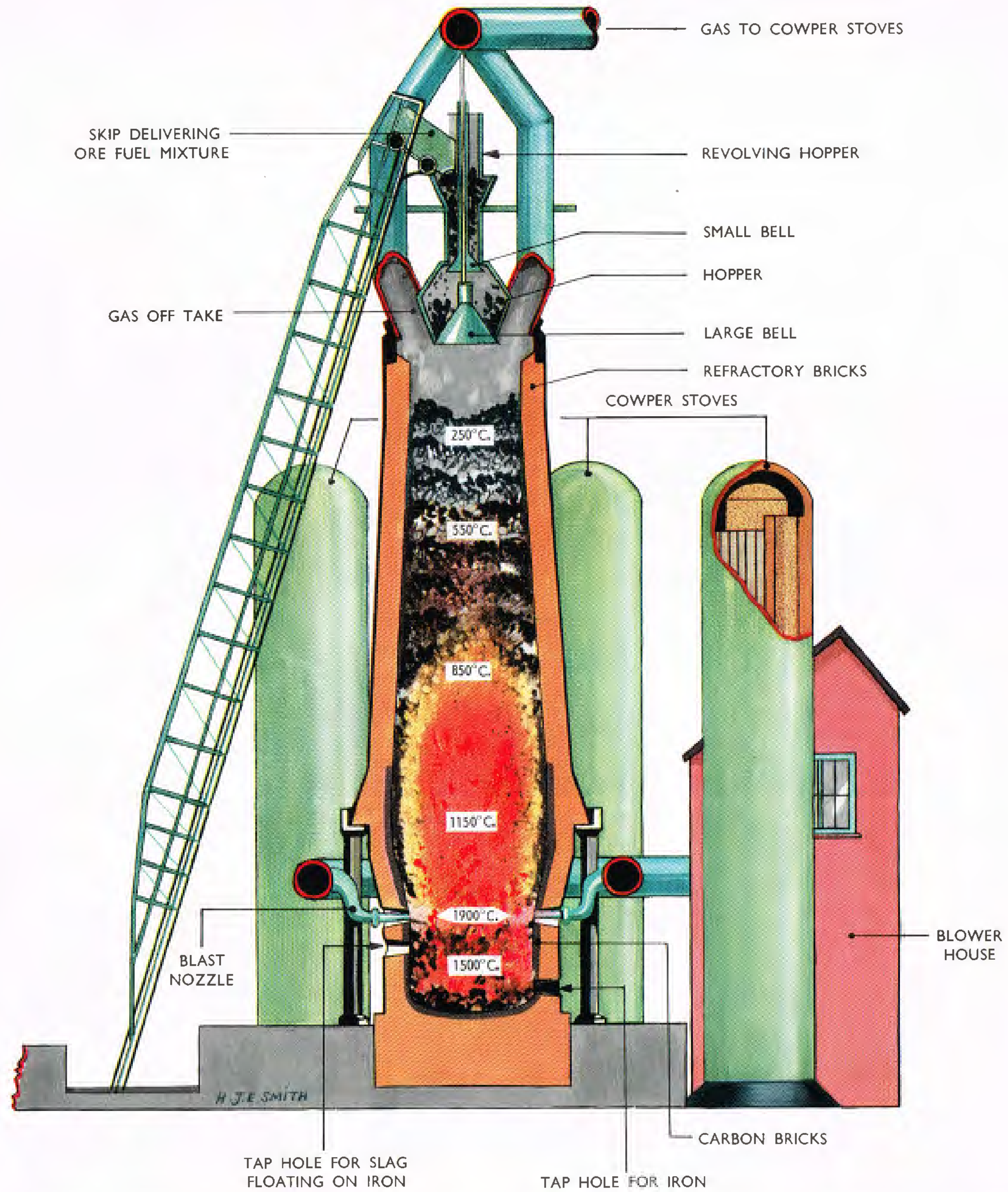
The next great improvement, which was first introduced about 1810 by Richard Murdoch, was the heating of the air blown into the furnace. Murdoch used cast iron pipes heated with fires on the outside. About a hundred years ago Cowper invented stoves of novel design for heating blast furnace gas by what is known as the regenerative principle. The stoves are usually in groups of three: each is filled with loosely packed brickwork known as chequers. Blast furnace gas is burnt at the bottom of two of the stoves, heating the bricks, while air is blown over the furnace from a previously heated stove. About every half-hour the gas and air flows are changed round so that the gas heats the bricks of a stove which has been cooled down in heating the air, and vice versa.

As the years have gone on, the temperature of the air leaving these stoves has been increased by improvements in design, and it is now possible to heat the air entering the furnace to 1000° C. (1700° F.). This means that the air is at a bright red heat.

Now, a blast furnace produces a crude cast iron, and at one time all the molten iron was run out of the furnace into moulds, where it cooled into slabs known as pigs. This pig iron is a very crude, brittle iron containing a lot of carbon in chemical combination with the iron as well as impurities such as sulphur and phosphorus from the fuel and ore. The pig iron has, therefore, to be refined. Steel is essentially iron containing small but controlled quantities of carbon and free from silicon, sulphur and phosphorus. Until fairly recently the pig iron was transported to separate works for the manufacture of steel. The iron had to be melted and heated with refining agents, and for this purpose large quantities of gas were required, much of which was separately made.

After World War I, steelworks began to be built beside the blast furnaces so that the molten crude iron could be charged directly into the steel furnaces, which were heated by a mixture of blast furnace gas and gas from the coke ovens. This type of works is known as an integrated steelworks.

Over the years, bigger and bigger blast furnaces have been built, and the latest furnaces have hearths up to 31 ft.



diameter. The largest furnace in Europe is in fact at Margam in South Wales; it is 248 ft. high and has a hearth of 31 ft. The furnace requires for its operation 125,000 cu. ft. of air per minute and produces 10,000 tons of iron a week.

It has only been possible to build furnaces of this size by applying a host of modern engineering techniques, such as water cooling of the supporting structure and use of specially resistant refractory brick linings. A recent development is use of bricks made of carbon, since ordinary refractories have a limited life through chemical reaction with the high-temperature gases in the furnaces.

Further work towards improving the blast furnace is still proceeding. As already mentioned, air contains only 21% oxygen. Chemical reactions in a blast furnace proceed faster when the air in the blast is enriched with oxygen, and it is now possible to try this on a full scale because machines have been designed for extracting the oxygen from the air in large quantities at relatively low cost.

Another development under trial is running the blast furnace under pressure. One of the limitations preventing increase in the output of a blast furnace is the pick-up of fine materials by the gases as they pass up the furnace. If it is possible to raise the pressure at the top of the furnace stack to 15 lb./sq. in., the velocity of the gases for the same output will be halved. Another benefit is that the chemical reactions take place faster under pressure.

It will be seen, therefore, that a blast furnace is a highly developed piece of chemical engineering equipment which has required for its development new knowledge in several branches of technology. During the centuries the amount of fuel per ton of iron has been reduced to one-tenth of that used in the early blast furnaces. This is the same as the factor of improvement for steam engines in terms of fuel per horsepower.

EMPEROR
MAXIMANIUS HERCULIUS

A ROMAN EMPEROR'S HUNTING LODGE

By
Margaret
Farrell

The mosaics of the fourth-century Imperial hunting lodge at Piazza Armerina in Sicily are one of the major archaeological finds of the century. Their discovery posed a new problem: too big and too numerous to transport to a museum, how were the mosaics to be protected? The answer was found in 'Perspex.'

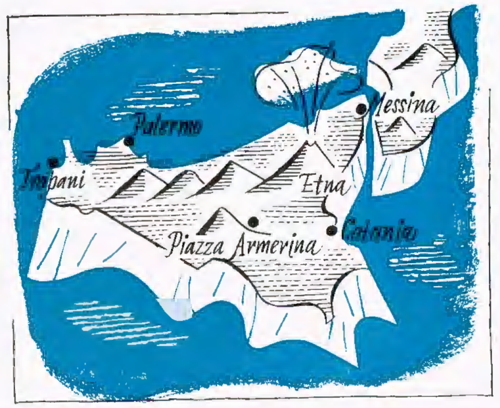
In September last year I went to Sicily to make a film—rather an unusual film. Its stars are two thousand years old.

A few miles from the city of Piazza Armerina, at the foot of Mt. Mangone where a stream rushes to join the river Gela, is a valley which has interested scholars for centuries. In 1761 traces of an ancient building were discovered, but it was not until 1950 that planned digging began. Hundreds of tons of earth were removed. Beneath them lay, not a temple as was originally thought, but a magnificent villa built in the fourth century as a hunting lodge for the Emperor Maximanius Herculius.

The site was peaceful, secluded, well watered and surrounded by woods which, in the Emperor's day, were a huntsman's paradise. Every year, from May to October, the Emperor and his family with their 400 retainers lived there.

A huge aqueduct surrounded the lodge. Much of it is still intact. So are the baths—hot and cold—and the gymnasium where the Emperor and his followers kept themselves fit with strenuous exercises. Although many of the rooms have still to be uncovered, enough has now been revealed to show that the villa was built in four groups of halls, each with galleries, peristyles, courts, fountains and baths.

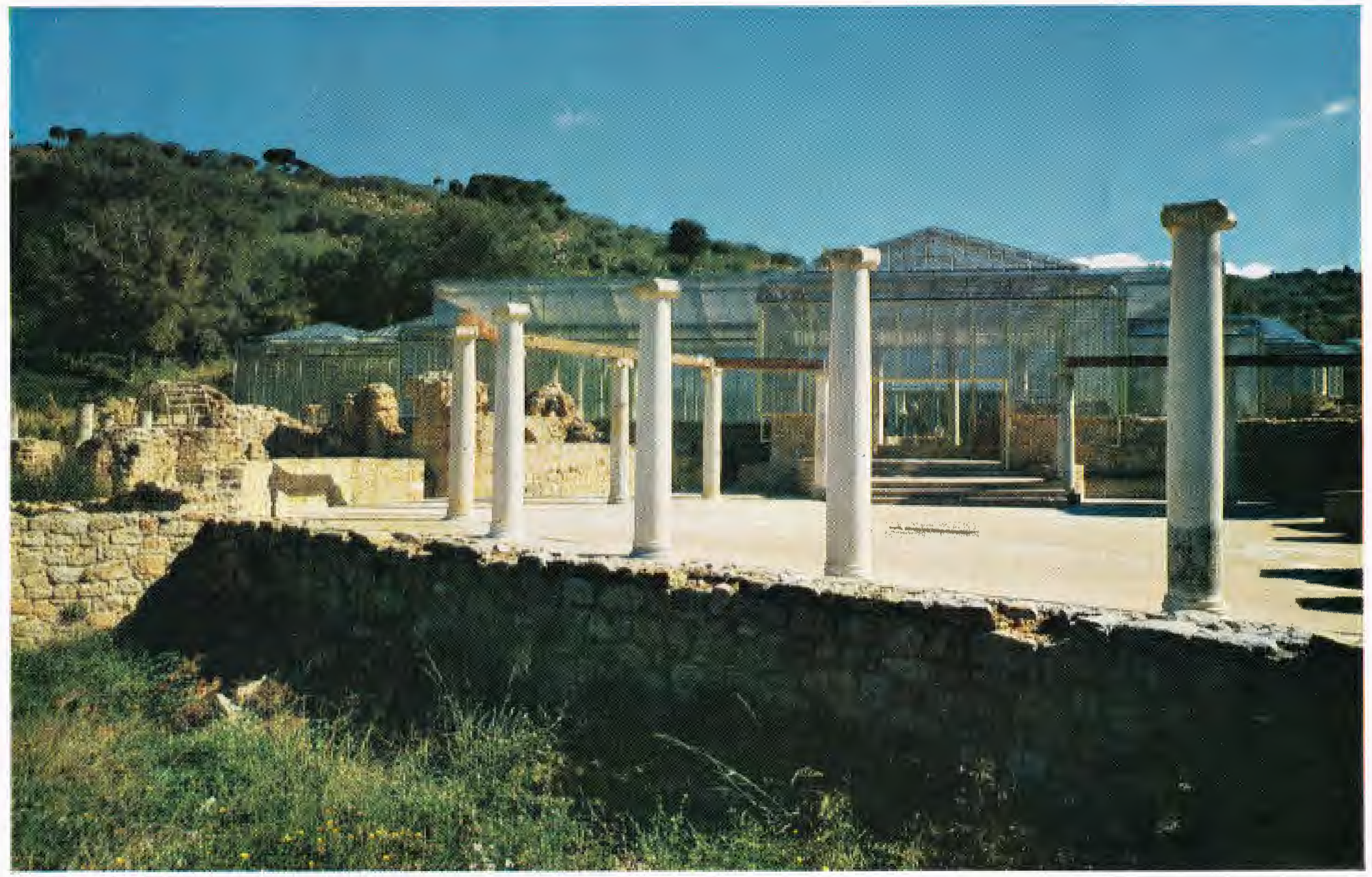
The lodge has dignity and a peaceful beauty, but it is the mosaics which are its glory—adding colour, life and humour to the magnificence. It must have been wonderful to be a fourth-century Roman baby learning to walk upon colourful stone carpets full of pictures of gods and goddesses, ships, flowers and animals.



The colours are muted. Time and dust have dimmed their brightness, but when water is poured over them they glow again with all their early richness.

There are so many mosaics that it would take many months to study them all. My favourite is the Small Hunting Scene. It is not too big, so one can see it as a whole. The colours are brighter than any of the others because this particular floor has been waxed. It tells the story of a hunt in the woods above the villa. It is early September, and the Emperor is going hunting. First there is the sacrifice to Artemis, who, quiver in hand and surrounded by laurels, stands before a square altar. After the sacrifice the hunt makes ready to start. Great hounds strain at their leashes, horses prance, huntsmen and servants are ready. And then the hunt itself. A fox flees from a pair of hounds—one grey, the other red. An aged huntsman with brown whiskers and a short beard holds a newly killed hare. A wild boar is held within the meshes of a net on a shoulder-borne pole. One hunter carries a bundle of reeds for birdlime, a hooded falcon rests on the shoulder of another.

After the hunt comes the feast, held in a clearing of the wood. The dining table is under a red curtain fastened to two small oak trees. The whole scene throbs with life and colour and excitement. Servants are busy offering glasses of red wine or taking bread and game from wicker baskets. One man is handing over a succulent roast; a little black boy blows on the fire which will roast a plucked fowl.



The monumental entrance, looking towards the peristyle. Some pillars are wholly or partly original, others are reproductions. On the far left steps lead down to the baths and gymnasium.

The Emperor Maximanius Herculius watching preparations for embarking beasts after the Great Hunt. This scene is a detail from the Great Hunting Corridor on the opposite page. The whole of this long mosaic carpet is a triumph of colour and characterisation.

Chamber of the Ten Maidens. This mosaic of the ten "bikini" maidens is laid over an earlier paving of geometrical patterns, part of which can still be seen.

The Great Hunting Corridor containing a spectacular carpet of mosaic which flows like a surrealist carpet along the pillared corridor.

The Small Hunting Scene. The left upper section illustrates the departure for the chase. In the centre is Arthemis, goddess of the hunt. In the bottom right-hand corner hunters battle with a wild boar which has unseated a horseman.

My next favourite is quite different—restrained, quiet and stylised. It has been called The Spirit of Africa. Africa is shown as a girl with flowing dark hair bound by a narrow ribbon. In her hand she holds a phoenix rising from its burning nest. On one side is a charming little elephant which looks like a cuddly toy, and on the other side a tiger—a snarling, purposeful beast.

The most spectacular mosaic is the one which flows like a surrealist carpet over a pillared corridor. It tells the story of a mighty hunt when animals from all over the world were captured and brought to Rome.

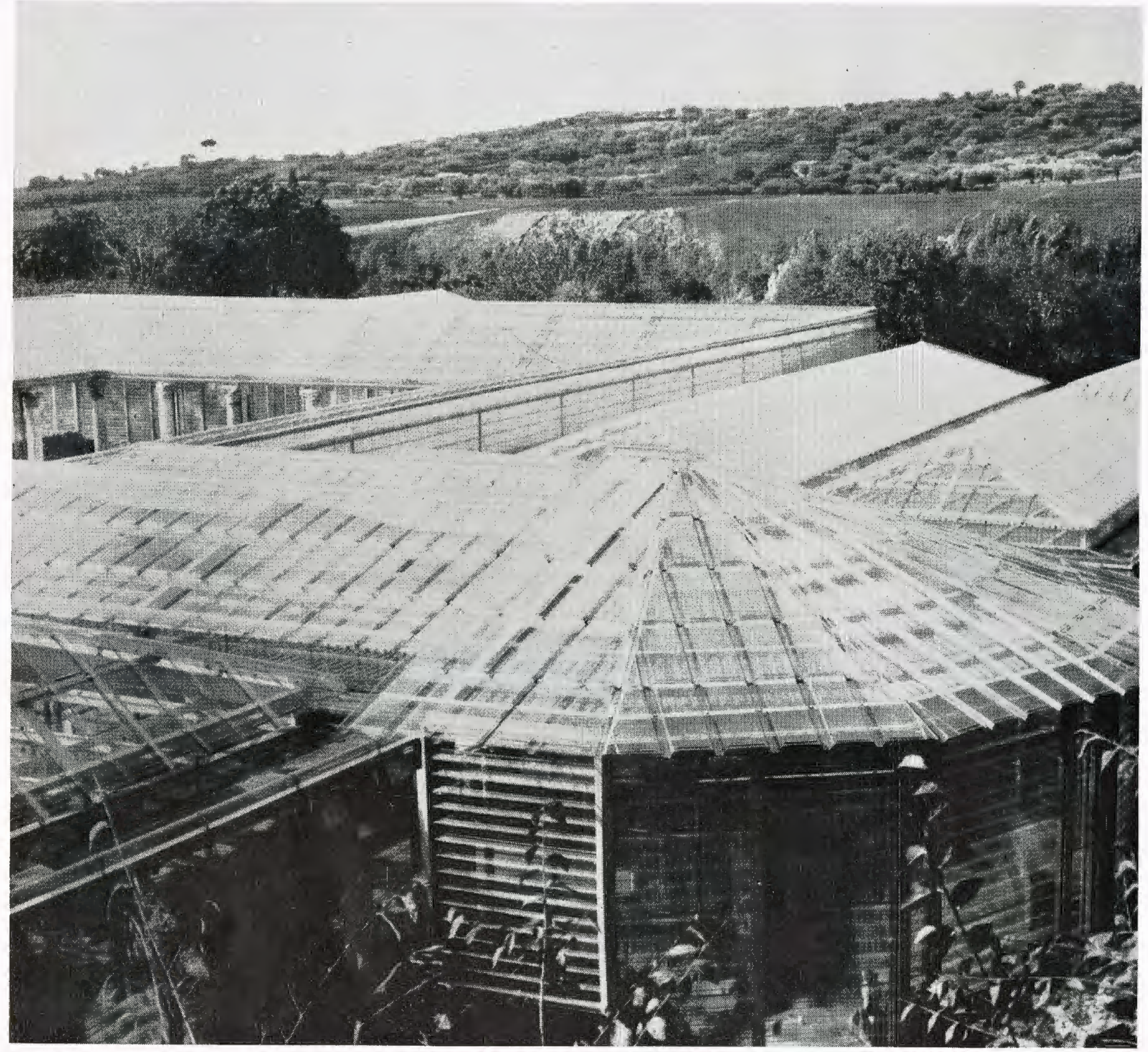
Against a landscape of plains, rocks, hills and forests this tremendous hunt is re-enacted—two hunts really, for we see tigers ambushing wild goats, panthers pouncing on fleeing antelopes, a lion clawing furiously at a wild ass. And then the humans enter to hunt the hunters. Now the tiger is at bay, snarling at the javelins poised in the hands of hunters whose richly embroidered tunics and streaming cloaks glow like flames against the dark trees. Panthers are lured towards a baited trap, lassos whistle over the heads of wild horses, a mounted huntsman tries to escape the vengeance of a tigress whose cubs he has stolen. On a sea crowded with fish, ships and sailors wait.

Brooding over the hunt and the preparations for embarking the animals stands the figure of the Emperor Maximanius Herculius himself. He wears richly adorned trousers and tunic and the characteristic cylindrical hat of the period. His portrait in mosaic corresponds to a contemporary description of "a man of good height and vigorous, with straight greying hair, a perfect beard, dark complexion, strong nose and fine eyes."

On either side of the Emperor stand two officers of the guard carrying great round shields. On the shoulder of one is the letter H—the abbreviation of the legionnaires called Herculia in honour of Maximanius.

The detail of the Great Hunting Scene, its movement and characterisation, is quite fantastic. We see not only the organisation and physical effort, but also all the emotional reactions—fear, haste, frustration and frayed tempers. One of the officers, quite clearly, has reached the end of his tether. With upraised cane he is advancing on a shrinking servant who seems to have parked his bullock cart in an awkward place.

Most of the mosaics are scenes of hunting, fishing, sailing and fighting, but the Ten Dancing Maidens provide a lighter touch. It is difficult to see why the scene has been given this title. The girls, wearing 1960-type bikinis, appear to be performing the Roman equivalent of Health and Beauty. One is jumping, another stands poised ready to throw a discus, some are playing with a gaily coloured ball. A tall, elegant beauty wrapped in a golden mantle presents prizes to the successful competitors.



A view of the 'Perspex' roofing. Some 3000 sheets of 'Perspex' were used to reconstruct the villa in its original shape.

The richness and extent of the mosaics posed a new problem for the authorities. The mosaics were too large to move to a museum. How then were they to be protected, short of a complete and fantastically expensive reconstruction of the site? The answer has been found in 'Perspex,' more than 3000 sheets of which have already been used to provide cover and shelter for the treasures, reproducing in 'Perspex' the original shape of the walls and roof of the hunting lodge in so far as scholars know what this was. The harshness of the Sicilian sun is softened by the faintly blue 'Perspex,' and it falls on the mosaics with a gentler light. Thus has been re-created some of the beauty of an imperial lodge which began to decay after the Arabs and the Normans left the valley and was finally buried by a landslide—a landslide caused by the cutting down of the forests which had been the reason for the villa's existence.

The Piazza Armerina site is not yet well known, but in time it may become as famous as the Greek temples of Delphi. Already tourists from all over the world are arriving at the rate of two hundred a day.

NEWS IN PICTURES

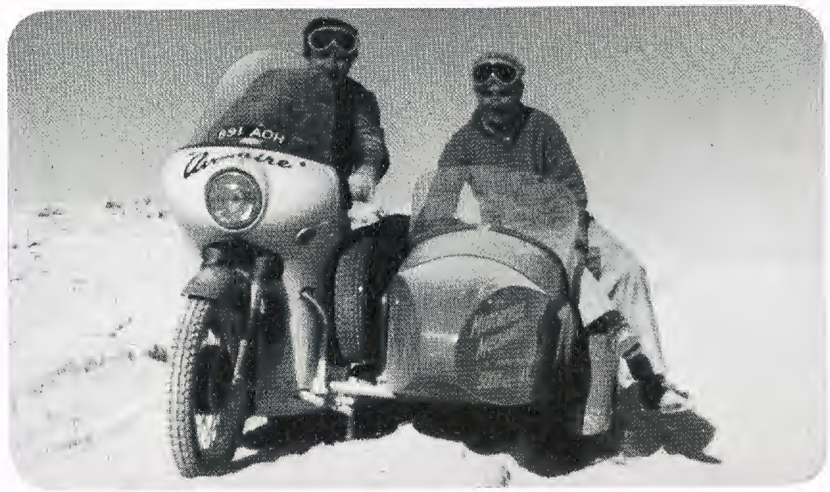
Home and Overseas

The Board in Session. This photograph was specially taken by *The Times* on 10th March to start their new series "Directors in Session." It was the first board meeting presided over by our new Chairman, Mr. S. P. Chambers, and it was also the first time the Board has been photographed in the Board Room of Imperial Chemical House. To complete the record, photographs of the seven directors not present at the meeting appear at the top of the next page. These are (left to right) Dr. R. Holroyd (a Deputy Chairman), Mr. P. C. Allen (non-executive), Lord Chandos (non-executive), Dr. J. S. Gourlay (Overseas), Mr. C. R. Prichard (Heavy Chemicals Group), Mr. W. D. Scott (Commercial) and Field-Marshal Sir William Slim (non-executive), who was appointed a director at the meeting

KEY TO PICTURE

1. Mr. S. P. Chambers (Chairman)
2. Mr. J. H. Cotton (Treasurer), who retired on 31st March; has been succeeded by Mr. A. E. Frost
3. Mr. J. L. S. Steel (Economic Planning), who retired on 24th March
4. Mr. R. A. Banks (Ammonia and Agriculture Group)
5. Mr. R. C. Todhunter (Overseas)
6. Lord Glenconner (non-executive)
7. Mr. D. J. Robarts (non-executive)
8. Mr. S. F. Burman (non-executive)
9. Mr. E. A. Bingen (a Deputy Chairman)
10. Mr. L. H. Williams (a Deputy Chairman and responsible for the Dyestuffs and Pharmaceuticals Group)
11. Mr. G. K. Hampshire (Paints and Plastics Group)
12. Mr. C. M. Wright (Personnel)
13. Dr. J. Ferguson (Research)
14. Dr. R. Beeching (Development and Technical)
15. Mr. P. T. Menzies (Finance)
16. Mr. C. Paine (Fibres and Heavy Organic Chemicals Group)
17. Dr. J. Taylor (Metals and Nobel Group)
18. Mr. J. W. Ridsdale (Solicitor)
19. Mr. A. G. Woods (an Assistant Secretary)
20. Mr. R. A. Lynex (Secretary)

Full house. Mr. Percy Thrower (third from left), the gardening expert, is attracting packed houses during his current lecture tour of the Divisions. He is seen here at General Chemicals Division's Horticultural Club, Runcorn, with Mr. H. Smith, the Division Chairman, on his right, chatting to members of the audience



Sahara crossing. 'Alkathene' jerrican-type containers, 'Perspex' windscreens and polythene drinking mugs were all part of the equipment taken on a recent endurance test for British motorcycles. Carburetters and handlebar controls were supplied by Amal Ltd., an I.C.I. subsidiary company in Metals Division. Motorcycling a total of 4390 miles into the Sahara Desert and back has proved that both the machines and plastics can take it. The venture was sponsored by the magazine *Motorcycle Mechanics*

Three years. Nobel Division's Blackpowder Department has completed three years of accident freedom—915,000 man-hours, and not for the first time they are glad to be holding the factory's interdepartmental safety trophy

Five of the top Paris fashion houses have used 'Terylene' fabrics for the first time this spring. This 'Terylene'/cotton two-piece by Pierre Cardin is in Ascher's iris-patterned fabric in mauve and blue on a white ground

Colin Sherlock became the U.K. 8 st. 7 lb. Class A boxing champion of the A.T.C. when he won his final bout recently. Previously in the Hillhouse Messenger Service, Colin has just started as an apprentice electrician at General Chemicals Division's Hillhouse Works

Mr. E. Parker, Bombay Director of I.C.I. (India) Private Ltd., has been appointed President of the All-Indian United Kingdom Citizens' Association for 1960. The Association formed in 1947, is non-political, and is the official organisation representing the British community in India

When Mr. J. E. Marriott, Chief Fire Officer at Metals Division's Summerfield Research Station, receives his award for 20 years' service with the Company this year, he will become the owner of two long service awards. He already possesses a silver medal and bar representing 25 years' service and good conduct in the British Fire Service and has been responsible for the training of many successful first aid teams

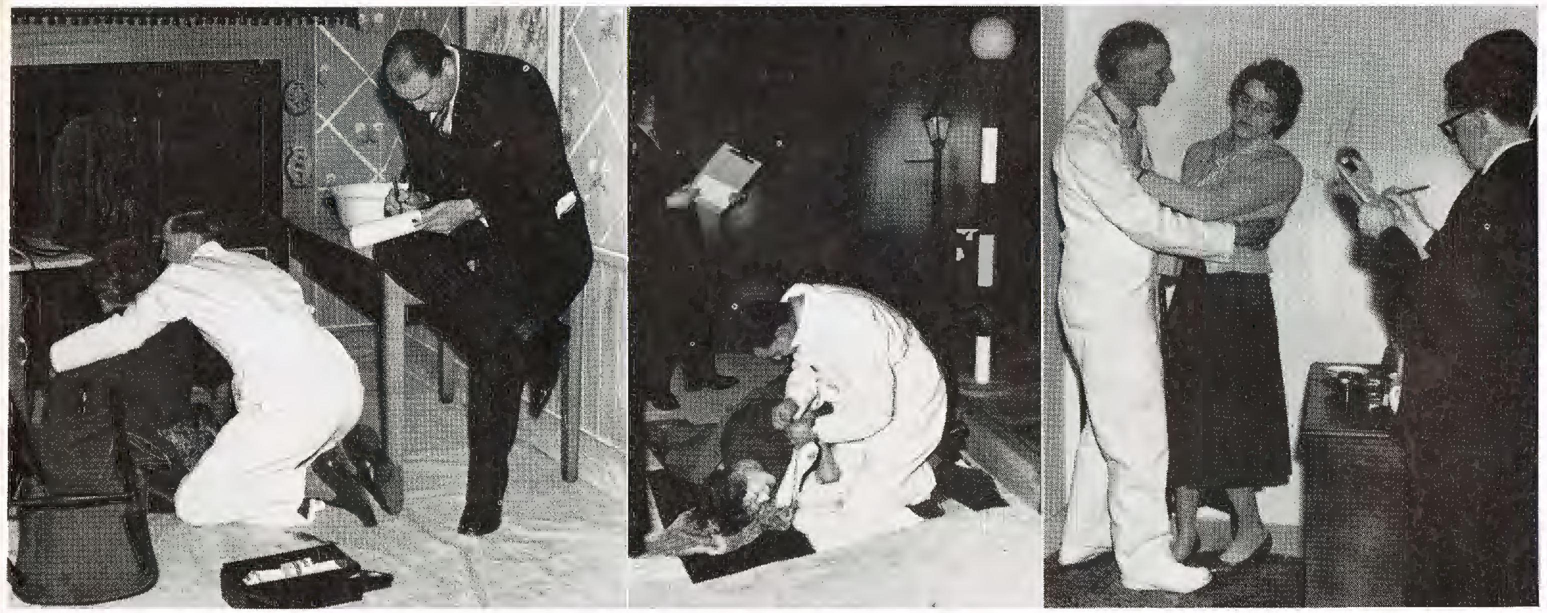
Parents' day. Apprentice fitter David Boyle demonstrates the machine hacksaw during Parents' day at Nobel Division's Apprentice Training School

Independence day celebrations in the Union of Burma held earlier this year included an exhibition to which I.C.I. (Export) Ltd., Rangoon, contributed a stand. Dr. H. W. H. Jones, Dyestuffs Manager of the Rangoon Office, shows the President of Burma, U Win Maung, and his wife Daw Mya May round the stand

"Boom, boom" is the unusual but appropriate inscription worked in the sweater of explosives man Mr. Robert Laurin, a C-I-L explosives dealer in Mont Laurier, Quebec

I.C.I. FIRST AID FINALS—1960

FIRST Plastics Division's Hillhouse Works carried off the I.C.I. First Aid Trophy at the Finals in London last month. Runners-up last year, the identical team came top out of ten Divisional teams competing in this year's finals with 274½ out of a possible 400 points. Mr. C. M. Wright (left), our new Personnel Director, presents the trophy to Mr. T. G. Butcher, the team captain. The other members of the team are Messrs. N. Gartside, J. Fitzpatrick, H. Smith and J. J. Martin (reserve)



Individual tests. Our photographs show (left) a member of Billingham Division's Trimpell Works team dealing with a heart attack case, judged by Dr. J. C. Graham, Principal Medical Officer, Heinz Food Co. Ltd. Centre: A pedestrian crossing casualty gets first aid from a member of the Hyde team. Right: A diabetic office worker with insulin poisoning is attended by a Dyestuffs Division's man, watched by Dr. A. H. Jones, Area Medical Officer, British Railways

SECOND I.C.I. (Hyde) were runners-up with 258½ points. Left: Competing in the team test—an explosion in a chemical works. The Judge Dr. A. C. White-Knox, Surgeon in Chief of the St. John Ambulance Brigade, is seen on the extreme left. Above: The team complete with mascot, receiving their prizes.

Making fireworks resulted in severe burns for this casualty, here being treated by a Wilton Works man

THIRD Wilton Works Olefine Works team came a close third with 253½ points. Here they receive their prizes of silver spoons from Mr. Wright

Victims for the tests were supplied by the Casualties Union. Above: Behind the scenes being made up for their various roles

People and events . . .

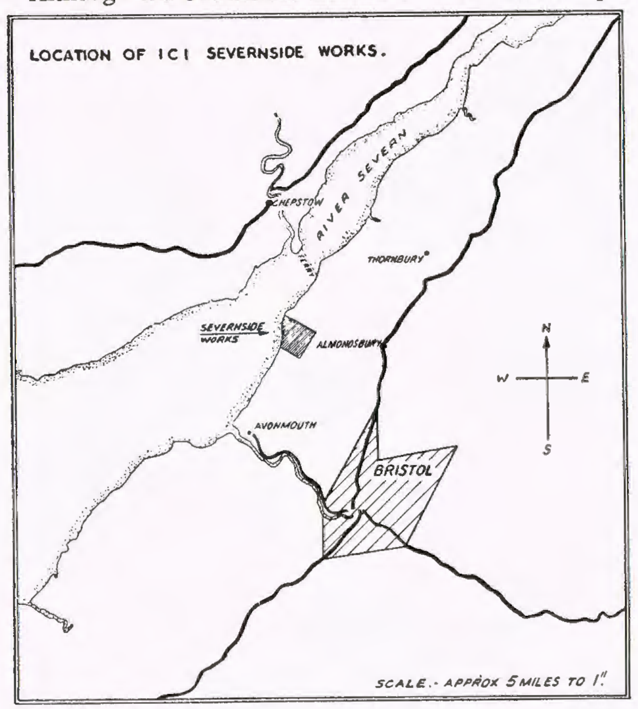
Green Light for Severnside

BUILDING is to begin almost at once on the Company's new thousand-acre site in South Gloucestershire, and the first plants there will be for Heavy Organic Chemicals Division. Statements to this effect were issued recently to the national press. The first stage of construction on the site will involve spending something like £5 million on site development and on the construction of plants for making 35,000 tons a year of ethylene oxide and ethylene glycol (a raw material for 'Terylene,' explosives and anti-freeze) and associated products.

The main raw material, ethylene, will be supplied by the Esso Petroleum Co., at the rate of 40,000 tons a year, by cross-country pipeline from their refinery at Fawley, near Southampton. The pipeline will be the first of its kind in Britain to link physically an oil refinery and a large chemical plant more than 70 miles apart for the direct supply of intermediate raw materials.

Although the Severnside announcement suggests a departure from I.C.I.'s present naphtha-pyrolysis method of producing ethylene—in a plant popularly known as a cracker, of which H.O.C. Division has three at Wilton—the apparent anomaly has in fact been dictated largely by the need to extend manufacture as rapidly as possible under the boom conditions now obtaining, and does not rule out the possibility of a cracker at Severnside in the future.

The new plants are scheduled to come on stream by the end of 1961. The ethylene oxide will be made by the air oxidation process developed by the Scientific Design Co. Inc., who will also design the plant. The plants for ethylene glycol and associated products are being designed by H.O.C. Division staff.



The general pattern of development of Severnside Works is expected to resemble in many respects that of Wilton, to whose Council the Severnside development team is answerable. At present the team, headed by **Dr. H. S. Hirst,** is twenty-nine strong, and nine of them are former Wilton men. The two latest recruits are **Mr. F. B. Hayes,** one-time deputy work study manager at Wilton, who has been appointed senior construction engineer, and **Mr. J. Trelfa,** who is the works secretary and accountant.

* * *

A 'Terylene' Pioneer Retires

ON 10th February 1944 an historic meeting took place between officials of the Calico Printers' Association, the Ministry of Supply and I.C.I. It was at this meeting that I.C.I. first discussed with C.P.A. the possibility of taking over the development of 'Terylene.' One of I.C.I's representatives at that historic meeting was **Mr. W. F. Osborne,** who last month retired as Fibres Division Production Director.

When in 1943 I.C.I. decided to work in the field of synthetic fibres, Mr. Osborne, who was then in America, was instructed to make a special study of methods of synthetic fibre manufacture, and on his return to Britain he was made head of a special fibres development department being set up within Plastics Division. He and his tiny team set about evaluating candidates for fibre-making, and they were approached by the Ministry of Supply about the merits of Whinfield's 'Terylene' patent. By the end of 1946 they had done enough work on this fibre to justify the cessation of all other fibre work.

Mr. Osborne

At the end of 1949 the pioneer plant was started up at Hillhouse and a year later the Board sanctioned the construction of the first 'Terylene' plant at Wilton—a justification of the faith and dogged efforts of Osborne and his small band.

With the formation of the 'Terylene' Council in March 1951, Fibres Development Department ceased to exist and Mr. Osborne was made an original member of the Council.

In his younger days he was an enthusiastic mountaineer and rugger player. Now he has retired he says he plans to indulge in the less strenuous pursuits of photography and gardening. *Otium cum dignitate* he claims is his motto from now on.

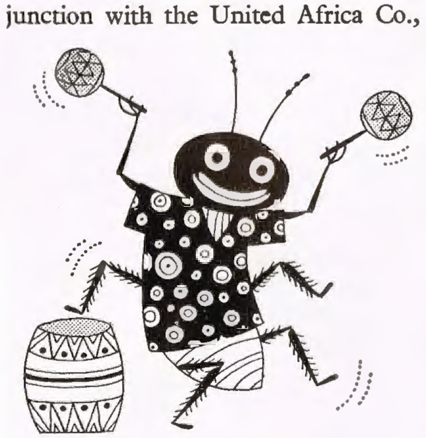
Garden Notes

THIS month our back cover gets a new look. We are abandoning the traditional black-and-white cover picture for a new gardening feature specially written for us by Mr. Percy Thrower, the TV gardening expert. Mr. Thrower, who once worked on the royal estates at Windsor, is now Parks Superintendent for Shrewsbury. He made his first broadcast twelve years ago and now has over 500 broadcasts and more than 250 television appearances to his credit.

The changed back cover of the *Magazine* means that we can no longer consider black and white prints for publication, but we are still just as interested as ever in readers' colour photographs, and it is the transparencies or negatives we would like to see, not colour prints.

Capsid-killing Calypso

SALES of 'Gammalin,' Plant Protection's insecticide for use against the cocoa capsid bug, are being promoted in a novel fashion in Nigeria. In conjunction with the United Africa Co., Plant Protection's selling agents in that country, a capsid-killing calypso has been recorded by Victor Olaiya and his Cool Cats Orchestra. One side of the record is in English, the other in Yoruba. The record is to be played in stores throughout the cocoa-growing area, and copies will be on sale.



Here is a typical verse:

When your cocoa tree leaves
  are turning brown,
When all the branches are
  falling down,
When you can say
That it's had its day,
The capsid's sucking its life
  away,
Then the "weaklingman" says
  "Never no more,"
But the "sensible man" goes
  straight to war
With 'Gammalin'! 'Gammalin'!
'Gammalin' at ten bob a tin.

Agricultural Affairs

THE reorganisation of Central Agricultural Control, heralded by the announcement last December that Billingham Division was assuming responsibility for all its activities relating to aspects of agriculture other than crop protection and animal health (hived off to General Chemicals Division and Pharmaceuticals Division respectively), is now almost complete.

Billingham Division has assumed direct charge of crop production research at Jealott's Hill, and it has been decided to concentrate all future agricultural development work there.

A small unit, still with the title of Central Agricultural Control but responsible to Billingham Division, is continuing in existence at Nobel House in Buckingham Gate to act as a link on general agricultural matters with Government departments and national agricultural organisations. The Agricultural Propaganda Department, including the Film Unit, are also remaining at Nobel House.

I.C.I. and the Archbishop

METALS Division received an interesting and colourful visitor recently. He was the Imam of Bathurst, the capital of Gambia, one of Britain's West African colonies. The Imam is head of the Moslem religion in that country. When asked by Government officials on his arrival in London what he particularly wanted to do and see while in England, he had two requests. He wanted, he said, to meet the Archbishop of Canterbury and to see titanium in the making at I.C.I. The Imam's interest in titanium

PEOPLE

Sir Alexander Fleck has been appointed president of the Society of Chemical Industry for 1960–61. He has been a member of the Society since 1917.

Miss Marjorie Edwards, secretary to Dyestuffs Division Personnel Director, Mr. J. A. G. Coates, was top prizewinner in a shorthand competition promoted recently by the *Manchester Evening News.*

Sir Walter Worboys, who resigned as I.C.I. Commercial Director last October, has been appointed a deputy chairman of B.T.R. Industries and a director of the Associated Portland Cement Manufacturers and of the British Portland Cement Manufacturers.

We regret to anounce the death on 6th February of **Mr. H. W. G. Bidgood,** a former Paints Division Managing Director who retired from I.C.I. in 1955.

Dr. John Lill, who works at I.C.I.A.N.Z.'s Osborne Works, is a member of the Australian cricket team currently touring New Zealand. Many people regard him as next door to a certainty for the next Test series against England.

Mr. Russell Currie, head of I.C.I.'s Work Study Department, is the author of a new book on work study just published by Pitman's. A reviewer in the *Financial Times* considered it "probably the best short textbook on work study so far written in this country."

The first man to be appointed to the payroll at Severnside, Chauffeur **George Stephenson,** formerly of Wilton Works, has received his eighth bar to the national safe driving award of the Royal Society for the Prevention of Accidents.

Mrs. E. L. Harman, the first industrial nurse in Paints Division and only the second in the whole of I.C.I. when she was appointed, has retired after 20 years' service.

Mr. J. W. McIvor, an electrical chargehand in the Ammonia Works at Billingham and a former vice-chairman of Billingham U.D.C., has been elected to Durham County Council. He defeated another I.C.I. man, **Mr. R. Duncan,** an electrical fitter in Gas and Power Works.

stems from his country's exports of ilmenite, one of the ores from which titanium can be made.

Approached by the Central Office of Information, Metals Division willingly agreed to organise a tour of the Witton titanium plant for the Imam, and in

The Imam of Bathurst at Witton

the picture above he is seen with his interpreter, Mr. Wadda, listening to an explanation by **Mr. G. W. Turner** of one of the processes in the melting of titanium.

Bravery Commendation

In a supplement to the *London Gazette* on 8th March it was announced that **Mr. R. F. McCormick** had been awarded the Queen's Commendation for brave conduct.

Mr. McCormick recently became Regional Sales Manager for explosives in the Northern Region, but was a member of Nobel Division Technical Service Department when the event which earned him royal recognition occurred.

Mr. McCormick

In February 1958 fire broke out in a hold of the M.V. *Seistan* in the Persian Gulf. Besides other cargo, the ship carried explosives. Fire-fighting procedures were adopted with some effect, and when Bahrein was reached unloading of the explosives to a barge was started.

On being informed of the circumstances Nobel Division sent out Mr. McCormick by air, but before he arrived there was a further fire and an explosion on board which sank the ship.

On arrival Mr. McCormick went on board the barge to examine the eighty tons of explosive already offloaded. This, since it had been subjected to steaming during fire-fighting operations, he found to be in an extremely dangerous state, with liberated nitroglycerine seeping out of the wooden boxes and forming into pools in various areas of the barge. As a result of his survey, it was decided that there was only one course of action possible. The barge would have to be destroyed by explosion.

The biggest risks were still to come. When the barge was towed out to open water, Mr. McCormick had again to go on board to prepare the demolition charges—a task complicated by very high seas and made doubly dangerous since the only means of ignition at hand was "spliced" safety fuse, over ten years old, which had been condemned by the military authorities.

New Ideas

A rich haul of do-it-yourself ideas awaited the visitor to the I.C.I. stand at the recent Furniture Exhibition in London. For all those who did not get there, here is a brief report.

Mural 'Vynide,' used on the walls of the stand, is now available by the yard and provides an interesting alternative to paint and paper. It is easy to use, reasonably priced at 14s. a yard (50 in. width), and is extremely hard wearing. Added to that, it is washable. It comes in both plain colours and printed designs. The range of patterns includes one like coarse linen used on the walls of the living room/dining room area of the stand, and a grained wood effect shown on one of the doors.

* * *

At present stockists are limited, but a complete range is available at Porter's showrooms in Weighhouse St., London, W.1, or you can get a list of local stockists from your nearest I.C.I. sales office.

'Vynalast,' a paper-backed p.v.c. foil, was also featured. Laminated to board, it is ideal for the doors of kitchen cabinets and for ceilings and partitions—an idea here for damp or badly cracked walls. Laminated 'Vynalast' is retailing at about 1s. 6d. to 2s. a square foot.

In the bedroom section of the stand a bed headboard of 'Vyweld' quilted p.v.c. with the look of leather provided a touch of luxury and brought many enquiries. This, however, is something for do-it-yourself enthusiasts to dream of for the future. At present I.C.I. (Hyde) have their work cut out meeting manufacturers' demands and have no plans as yet for making it available over the counter.

Gardeners' Sunday

On Sunday, 1st May, the grounds of Warren House, the Company's Staff Training Centre at Kingston-upon-Thames, will be open to the public from 2 to 6 p.m. under the Gardeners'

Sunday Scheme. The admission fee of one shilling goes to the Gardeners' Royal Benevolent Society and the Royal Gardeners' Orphan Fund.

The gardens at Warren House cover fourteen acres and are notable for the collection of trees and shrubs, many of them rare in this country.

There are actually two Gardeners' Sunday dates for 1960, the first Sunday in May and the last in June. Warren House is open only on the first date. That is when the display of azaleas, rhododendrons and other flowering shrubs should be at their peak. Hundreds of other gardens are being opened under this same scheme. We cannot obviously list them here, but a complete list can be obtained for 1s. post free from the Organiser, Gardeners' Sunday, Four Winds, Seale, Nr. Farnham, Surrey.

Mr. Minton Retires

Mr. T. H. Minton, who retired last month as Midland Regional Manager, had notable qualifications for the sales force. He held a first class honours degree in chemistry which he won at Manchester University in 1920, and an M.Sc. which he gained the following year by research, and actually began his career in the Company on the research side in the laboratories of the United Alkali Company. He soon, however, transfered to the sales force, where he was able to use his outstanding knowledge of science to good effect: indeed, some of his colleagues thought the effect could be devastating.

Mr. Minton

After the merger he joined the sales organisation of the new company. Based on Manchester, he tramped industrial Lancashire "on his own pins." Later he took over N.W. Division's special products section and initiated his customers into such mysteries as heat treatment, metal degreasing and sintering powders. Subsequently he took over the sales of Plastics and Chemicals, and by the time he was deputy Regional Manager he had the reputation for knowing more about chemicals than anyone else in the north of England.

Tom Minton's 38 years' service are only a small part of his family's achievement. In 1858 his grandfather began work at Widnes and on his retirement nearly fifty years later was Works Manager of Sullivan Works. Ten of his sons and grandsons (including Tom Minton's father) served in Widnes Works, two of them retiring after 46 years' service, and the family can between them claim well over 350 years' service in the Company.

'Visqueen' on the M1. This photograph by Mr. S. Brickman (Plastics Division) was taken during the contruction of the St. Albans bypass section of the London–Birmingham motorway. 26 ft. wide 'Visqueen' sheet—the widest seamless polythene sheeting ever made in Britain—was used as an underlay. In the foreground is the special mobile dispenser devised to carry and lay the 1000 ft. rolls of sheet.

I.C.I. in Mexico

Mexico is one of the countries striving hard to develop its industrial resources and to raise the standard of living of its 33 million people. Already there is a noticeable increase in the demand for consumer goods, and among these is paint. Paints Division hopes soon to satisfy a good part of this growing demand for paint products from a new factory which is being built at La Presa near Mexico City.

It was in 1958 that the Company decided to start manufacture in Mexico, and it then acquired a majority holding in a long-established and successful local paint company, Pinturas Servicio S.A. But their premises were too small and too cramped by their surroundings to permit expansion. So the decision was made to build a new factory, making use of I.C.I. know-how, with the object not only of increasing the overall capacity of Pinturas Servicio but also of making a whole new range of paint products available.

The factory is now nearly ready, and in some sections of the plant operating trials are already in progress. The official opening takes place later this month, when **Mr. R. C. Todhunter,** I.C.I. Overseas Director responsible for American affairs, and representatives of the Mexican Government will be present.

This is I.C.I.'s first manufacturing venture in Mexico, and when in full production the new factory will employ some hundred staff and workers, all but two of them Mexicans.

BINDING OF 1959 MAGAZINES

The Kynoch Press has again agreed to bind *Magazines* and inserts for those readers who would like this done.

The cost will be 12s. 6d. for a volume of *Magazines* or a volume of inserts, and anyone who wants to take advantage of this offer should advise his *Magazine* correspondent now.

First Aid Bouquets

For the past few weeks certain households in the Fleetwood area have probably found waking up in the morning less of an ordeal than it used to be, thanks to their brand new Hawkins electric tea-maker. These were the trophies brought home by the victorious Hillhouse Works (Plastics Division) team from the recent First Aid Finals held in London.

No one can grudge the Hillhouse men their victory. They were runners-up to Alkali Division's Middlewich

Works in last year's competition, and this year they came top—16 points ahead of their nearest rivals, I.C.I. (Hyde). Olefine Works (Wilton) came third, five points behind Hyde, and perhaps deserve a special bouquet for doing so well at their first appearance at the finals.

There was high praise from the examining doctors for all the teams taking part on Finals Day, and Dr. A. H. Jones, an area medical officer for British Railways, particularly commented on the way the standard has visibly gone up in the three years he has been connected with the competition.

RETIREMENTS

Some recent announcements of senior staff retirements are: **Head Office:** Mr. J. H. Cotton, Treasurer (retired 31st March); Mr. H. R. Payne, Head of Safety Department (retiring 30th April); Miss W. M. Springford, principal secretary to Sir Alexander Fleck (retired 31st March). **Fibres Division:** Mr. W. F. Osborne, Production Director (retired 31st March). **Nobel Division:** Mr. F. B. Wrightson, Engineering and Technical Director (retiring 30th April). **The Regions:** Mr. T. H. Minton, Midland Regional Manager (retired 31st March); Mr. W. F. Whiting, Northern Regional Sales Manager (Chemicals) (retiring 31st August).

APPOINTMENTS

Some recent appointments in I.C.I. are: **Dyestuffs Division:** Mr. S. E. Blurton, Division Work Study Manager; Dr. D. C. S. Pascall, Works Manager, Ellesmere Port Works; Mr. A. G. Rees, Works Manager, Burn Hall Works. **Head Office:** Mr. J. B. Doyle, Head of Safety Department; Mr. A. E. Frost, Treasurer. **Metals Division:** Mr. R. L. P. Berry, Director. **Nobel Division:** Dr. J. Bell, Engineering and Technical Director; Mr. I. H. Paterson, Manager of Export Sales Department. **Plastics Division:** Mr. J. B. Kitchin, Personnel Director. **Severnside Works:** Mr. F. B. Hayes, Senior Construction Engineer; Mr. J. Trelfa, Secretary and Accountant. **The Regions:** Dr. J. P. Dickson, Scotland and Northern Ireland Regional Manager; Mr. R. F. McCormick, Regional Sales Manager (Explosives), Northern Region; Mr. D. R. Mackay, Midland Regional Manager. **Canadian Industries Ltd.:** Dr. Hugh Reid, Director (in addition to his duties as President of I.C.I. (New York). **Alkali and Chemical Corporation of India Ltd.:** Mr. J. Dick, Alternate Director to Mr. B. R. Goodfellow. **I.C.I. (India) Private Ltd.:** Dr. J. C. Hornel, Director (in addition to his duties as Director and Works Manager of I.E.L. at Gomia). **Indian Explosives Ltd.:** Mr. M. G. Satow, alternate Director to Mr. B. R. Goodfellow.

MR. LINCOLN STEEL

Mr. J. L. S. Steel, I.C.I. Director responsible for economic planning, retired from the I.C.I. Board on 24th March, his sixtieth birthday. Mr. S. P. Chambers contributes this appreciation.

After having been with Brunner-Mond and I.C.I. for 37 years, Mr. Steel retired from the Company on 24th March, his sixtieth birthday. I am glad to have this opportunity of paying tribute to such an able colleague, who has served not only the Company, but also the country, well.

Lincoln Steel took his first job, appropriately enough, in his native county at Winnington, Cheshire, after a distinguished career at Christ's Hospital and at St. John's College, Oxford, where he graduated in Natural Science at the age of 22. During his first ten years with the Company he spent much of his time in the Research Department, though he did acquire works experience at Lostock and Sandbach and also helped in the start-up of Wallerscote Works; moreover he was for a while in charge of what later became the Operations Department of Alkali Division. The intellectual capacity which he displayed in these departments led to his appointment as a delegate director of I.C.I. (Alkali) Ltd. at the early age of 32, and in due course he served as the Division's managing director for a year before he became chairman in 1943. One of his most important achievements was to set up for the first time a techno-commercial department, which linked together the commercial and technical aspects of planning; it is interesting to note that this department had among its members no fewer than three other men now on the I.C.I. Main Board.

While he was on the Division board Mr. Steel found extensive opportunities for foreign travel and also had time to serve on the County Council of Cheshire, where he became a J.P. I know that travel and politics both occupy a prominent place in his wide range of knowledge and interests, and Chinese jade, antique furniture, china and clocks are specialised topics on which he can speak as an expert.

Lincoln Steel joined the I.C.I. Board in 1945, and with his retirement I lose the last executive colleague who was on the Board when I joined it in 1947. I have always been struck by his capacity to marshal his arguments and to produce them in an easy, flowing and convincing manner. His Board responsibilities have included at one time or another the Plastics, Paints and Leathercloth Group, Personnel, Overseas, Development and, in 1953, Group A (Heavy Chemicals). Towards the end of this period his commitments in the field of economic affairs grew, chiefly by virtue of his chairmanship first of the Overseas Trade Policy Committee of the Federation of British Industries, and then of the British National Committee of the International Chamber of Commerce—positions which he has held for some ten years. In 1957 it was recognised that the importance of this work to the Company, as well as to the country, was such that the Board decided to ask him to devote his entire attention to economic planning as his function on the Board was now called. It was in this capacity that his innate qualities of a prodigious memory, shrewd judgment and an exceptionally acute mind found their most decisive expression, for the discussions on European trade in which he became so deeply involved were difficult and prolonged. I.C.I., with so many of its exports going to Continental Europe, was of course intimately concerned with the question of tariffs in these expanding markets, and Lincoln Steel's previous experience of manufacturing industry and foreign trade, as well as his negotiating skill, were of great value not merely to the Company but also to the President of the Board of Trade and other British negotiators in Paris.

Those who attended Central Council in Blackpool last year (joint consultation, incidentally, was always one of his special interests) will recall his typically fluent and lucid exposition of this complicated subject and may well have detected his disappointment at the breakdown of the talks, as a result of which Europe now finds itself split into two separate economic groups, the "Six" and the "Seven," instead of a single free trade area with no internal tariffs.

My colleagues and I will miss Mr. Steel's penetrating and realistic approach to economic and political affairs and his quick cheerful wit, but I am quite sure that we have not heard the end of his valuable work in the field of international finance and overseas trade. He leaves the Company with our very best wishes for an active and happy retirement.

BERYLLIUM FOR ATOMIC ENERGY *(continued from page 114)*

architects, it is a simple, single-storey building with no windows at all. The only (literally!) outstanding feature of this modest structure is a 160 ft. stack soaring well above the nearby factory chimneys.

Inside, the building is broadly divided into contact areas where beryllium is handled, and non-contact areas free from beryllium. Air going into the plant, filtered and heated, is changed every three minutes and extracted through special ducts. About 200 tons of air is moved every hour and passes through the finest of filters before being discharged from the chimney. Sealing compound is used between all wall and ceiling joints, and a negative pressure is maintained inside the building, forcing all contact air to follow the prescribed route through the extract filters and keeping adjacent areas free from contamination. In the best operating-theatre tradition, flat ledges are kept to a minimum and, to make cleaning easier, floors are curved to the walls and all surfaces are smooth and painted.

As large a proportion as possible of the plant is "non-contact." Electrical and other ancillary production equipment, to which maintenance staff must have frequent access, is housed in "clean" areas, so are the stores, despatch section, amenities and messroom.

Before crossing the contact barrier you have to change all your clothes, putting on a freshly laundered set for each shift; on the way out you take a shower before putting on your own clothes. This ensures that no accumulation of beryllium builds up in such familiar dust traps as pockets and trouser-turnups.

Yet another safeguard has been introduced to complete the "defence in depth" which eliminates any health hazard. Air samples—sometimes as many as 3000 in a week—are taken at regular intervals, both inside and outside the plant. Filter papers from air sampling devices go to the Research Department, where the beryllium content is analysed. The permitted levels of contamination are, to any but acutely scientific minds, almost inconceivably low.

Inside the plant there must never be more than 2 micrograms of beryllium in any cubic metre of air, which is equivalent in volume to half a grain of sugar in an average living room, and much less than that of the proverbial needle in the haystack. For air leaving the plant the figure is 0·01 microgram per cubic metre—less than the beryllium content of many domestic chimneys. These amounts are very much smaller than any known to create a possible health hazard, and no illness traceable to beryllium has ever been recorded among those working in these conditions. In fact, as one newspaper reporter put it, "the air in this plant is so pure that one would expect the health of workers there to improve!"

So much for the techniques by which workers avoid contact with the irritating beryllium dust. The engineers responsible for designing the Beryllium Plant had, however, to contend with still another problem—that of safeguarding the quality of the product. Wrought beryllium for atomic energy work has to meet a most stringent specification, which limits contamination by certain elements to a few parts per million. Fortunately, when it comes to processing, the techniques necessary for the health of the workers also contribute to the well-being of the metal.

Five basic steps complete the conversion of raw beryllium powder into wrought products. At the two stages when it is particularly susceptible to contamination—during the initial refining process and in the course of consolidation by sintering—the metal is contained in vacuum furnaces, operated by remote control. The intermediate process of reducing the cast ingot to chips and grinding these to powder is carried out in glove-boxes—dust-proof 'Perspex' containers with portholes for the gloved hands of the operator. This technique is also used for the fourth stage, when consolidated material is machined to a size suitable for further processing. Inside the glove-boxes, suction pipes create an air velocity of 10,000 ft. a minute over the cutting tools and carry the dust into the extraction system.

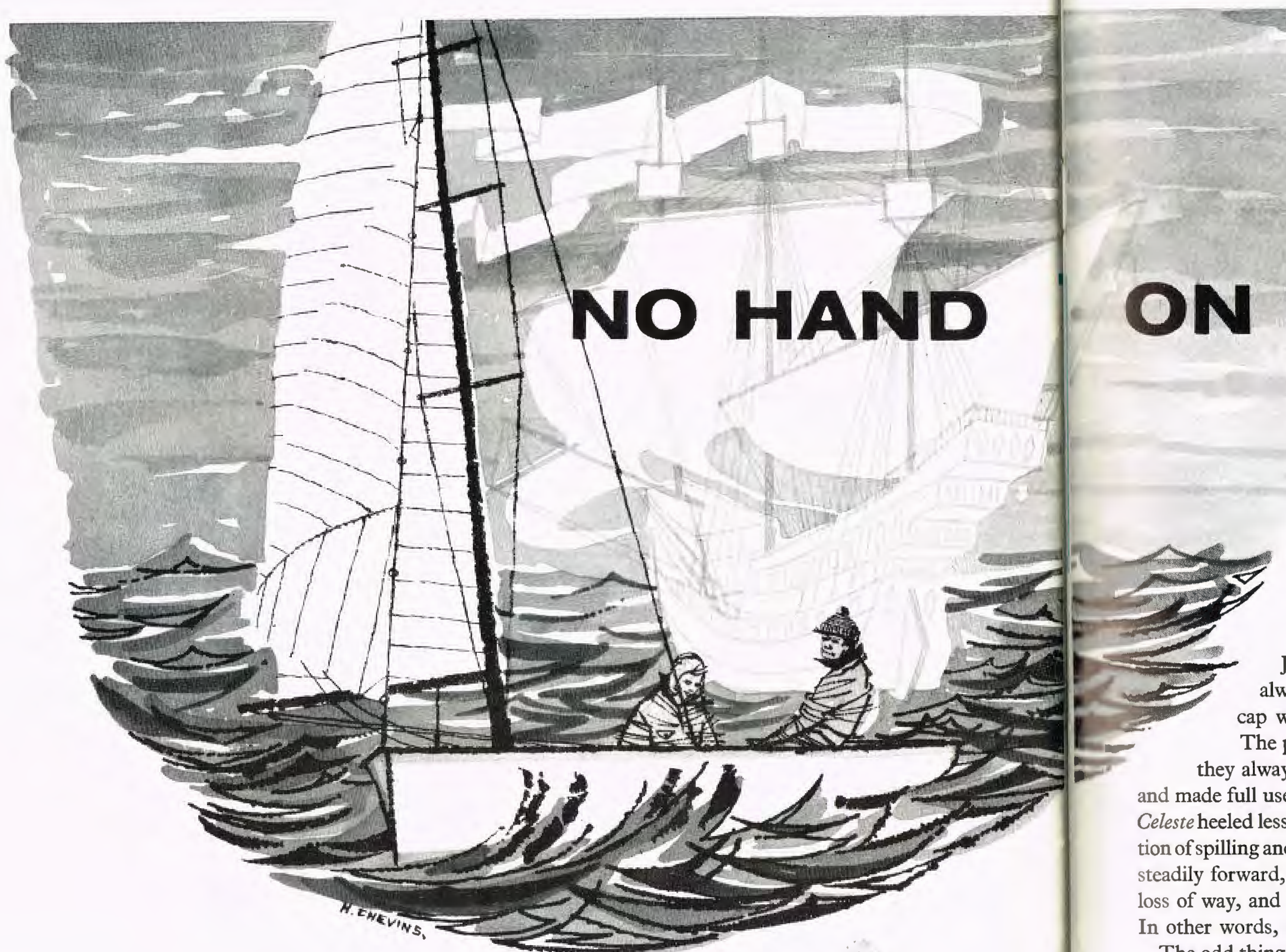
The last job is to convert the machined billet into tubes and rods. This is done by a conventional extrusion process, modified to counteract beryllium's natural tendency to seize on to a die. The remedy is to plate the extrusion slug or enclose it temporarily in a protective mild steel sheath.

Visitors to the plant—themselves "dressed overall" in protective clothing—will notice that those working in the plant wear different types of "uniform," ranging from simple white outfits of tunic, trouser and coverall to pressure suits complete with breathing apparatus. To add to the variety, some otherwise normally dressed workers wear face masks. The explanation pinpoints yet again the meticulous precautions insisted on by the plant's health physics team.

When a new piece of equipment is being commissioned (or when existing equipment is undergoing special maintenance) it is not possible to calculate in advance the extent to which the surrounding air will become charged with particles of beryllium. In these circumstances the only absolutely safe course is to isolate the operator completely, making him independent of the suspect air near the machine. As trials on the new equipment progress, direct evidence of the extent of air contamination is established by analysis, and in time a point is reached when the unwieldy "bubble suit" can be discarded: even then, to make doubly sure, operators continue to wear face masks which filter air inhaled through nose or mouth. It is only when reports from the Research Department show that contamination is completely controlled that employees graduate to the normal 'Terylene' working kit so reminiscent of that worn by Stirling Moss on the race track.

This, then is the environment—dust-free, air-conditioned, super-hygienic—in which 200 Witton people now spend their working hours. It is inevitably a somewhat isolated community, with its windowless walls and politely unwelcoming "Authorised Personnel Only" notices. Personnel seldom leave the plant during their eight-hour shift as, to prevent showering and changing becoming too much of a chore, they drink their tea, eat their meals and listen to their radio in their own pleasant and well-equipped messroom.

But there are conspicuous advantages to compensate for this ivory-tower existence. Even by I.C.I. standards working conditions are outstandingly good, and the remote control techniques so universally employed eliminate much of the hard physical effort to which metal-workers are accustomed. More important still, every worker in this plant has the profound satisfaction of knowing that he is a pioneer, breaking fresh ground in the non-ferrous metal world and helping nuclear engineering—perhaps the century's most spectacular new industry—to take another stride forward.



NO HAND ON THE TILLER

By
Roy Maby

ONE day in early June, John and Mary bought a boat of their own. She was a handy little fourteen-footer with centre-board and Bermuda rig. Of no particular class, she would race with the other handicaps.

For a week or so their spare time was all taken up fitting her out, new main and jib sheets, revarnishing her hull and altering the position of the snatch cleats and mast, fitting a kicking strap and racing flag. The club boatman worked with them and the final result was a credit to them both.

"What's her name to be? I could paint it on tomorrow."

"*Marie Celeste*," replied John rather sharply.

"'Twouldn't be my choice, no, nor any proper seaman since 1782," was the boatman's reply.

"My wife chose it—she says it goes with a swing."

Both men were silent—the choice accepted—mutually and silently agreeing that this was reason enough for any husband.

The following Saturday was sunny, with a moderate breeze inclined to be rather puffy at times. John and Mary sailed together and won easily.

There were two capsizes in the class, but at no time did *Marie Celeste* appear to be in trouble. Former champions congratulated them, but found them rather disinclined to talk about the race. The same thing happened for weeks on end—whatever the wind or conditions, John and Mary were out and they always won, even though their handicap was reduced right down.

The point was they never made a mistake, they always found the breeze in light weather, and made full use of the tide. In heavy weather *Marie Celeste* heeled less than other craft, the skilful combination of spilling and luffing to windward kept her moving steadily forward, and she went about without fuss or loss of way, and always exactly at the right moment. In other words, she was sailed to perfection.

The odd thing was, according to the binocular boys ashore, that John and Mary appeared themselves to be so inactive. Mary never seemed to lean out to windward, and John gybed perfectly in a heavy sea without moving his position. It must have been the result of perfect timing, and a confidence usually found only among helmsmen with years of experience. They were asked by others to sail their craft for them on numerous occasions, but always refused politely.

Towards the end of August they sailed for the Challenge Cup—a prize coveted by all. Conditions could not have been worse. The wind was fresh to strong with heavy squalls and rain, visibility was poor. The entries were few, all sorts of reasons being found why boats were just not fit to sail that day, from frayed mainsheets to lack of crew.

Marie Celeste made her usual perfect start at speed and within a second of the gun. As the race progressed conditions grew steadily worse, and the rescue boats were busy pulling back capsized craft and shivering crews to the clubhouse beach. Every boat in the under 18 foot handicap class had capsized or given up, returning with gear carried away and mostly on jibs only—every boat, that is to say, except *Marie Celeste*, lost to view in the fury of a rapidly rising south-westerly gale.

Suddenly, and in record time, she appeared out of the driving rain. Her last tack was beautifully timed, and she crossed the finishing line near the distance mark with her sails completely taut and not a flutter to be seen. The winning gun was fired, and an admiring group of men went towards the shore to help beach her. She came nearer; and it was then that a strange silence came over the waiting crowd—a feeling that something odd was happening stilled their excited voices.

Neither helm nor crew could be seen. *Marie Celeste* came up into the wind near the shore, her mainsail flapping free and her jib sheets flying. Everyone hoped that John and Mary would be found lying on the floorboards, too seasick or exhausted to move. But the craft was completely empty, silent and sinister after her faultless display of seamanship without human control. She was gently positioned on her trolley and pulled up behind the clubhouse.

All available rescue boats set off to search the course. The police, customs and coastguards were all informed, also the local fishermen and boatmen. These experienced men found no trace of John or Mary, nor did the relentless sea give up their bodies on this occasion.

If you would like to buy a fourteen-foot dinghy, there's one going very cheaply at our sailing club. She would need a lot of doing up. For several seasons now her fevered planks have not known the cool caress of clear salt water—cold east winds in winter have driven sand and seaweed into her bows, and her sails are ripe and discoloured. Should you take pity on her and bring her back to life, you would be well advised to change her name. Winning cups, with no hand on the tiller, can be dangerous.

April IN THE GARDEN

By PERCY THROWER

APRIL is the month when we see the first real signs of spring: the buds on the trees and hedgerows are bursting, showing the fresh green of the young leaves. To the gardener this is an indication that the temperature of the soil is rising and that it is time to complete any outstanding planting, particularly of evergreen trees and shrubs, and to push ahead with seed sowing of both flowers and vegetables. Many plants in the garden that have been dormant, and some we feared might not have survived the winter, are springing into growth and proving to us their complete hardiness.

During the past few weeks one of the most important tasks we have had has been pruning the roses, both the hybrid tea and floribunda roses. It is now possible to work between the bushes with ease, and we shall not get such an opportunity again until next year at this time. All dead leaves must be cleared away, as these could be the carriers of the black spot fungus from last year, and some manure, compost or peat can be lightly forked into the surface of the soil. As well as this, some organic fertiliser will help to encourage strong healthy growth. A tablespoonful can be sprinkled round each bush, but it must not come into direct contact with the stems—leave a space of 2–3 in. round the stems without fertiliser; the feeding roots of the bushes are further out in the soil. Lightly stir the fertiliser into the surface and leave the beds and borders neat and tidy.

The hardy border plants, lupins, delphiniums, Michaelmas daisies, heleniums, monarda, rudbeckia, phlox and others, will be growing far more shoots than it is wise to leave. If the growths are left clustered together the flowers will be poor and will not last half the time they should do. Thin out these shoots before they get too overcrowded, cutting them off just below soil level, leaving no more than four to six well-placed strong shoots on each clump. A teaspoonful of organic-based fertiliser round each of these will prove its worth long before the season is finished, and never will it be more easy to put on without getting it on to the leaves and stems than now.

As the grass on the lawn is now growing fast, here again some fertiliser evenly spread over the surface, allowing not more than $1\frac{1}{2}$ oz. for each square yard, will give the grass that lush green colour we all like to see on the lawn. Also, by using fertiliser on the lawn now, a selective weedkiller will prove more effective in killing the weeds in four or five weeks' time.

Later in the month the dormant tubers of dahlias can be planted out: there are few plants which add more colour to the garden from July onwards. Chrysanthemums can be planted outside and the corms of the gladioli. My favourite gladioli are the Primulinus hybrids, as they are neater than the large flowered ones and so good for cutting and arranging in the house. Seeds of the ever-colourful hardy annuals can be sown outside, and in the greenhouse those of the half-hardy annuals.

In the vegetable garden we can sow more peas for succession, lettuce, stump-rooted carrots, an early sowing of globe beetroot, spinach, and at one end or on a side border the seeds of cabbage Savoy, autumn and winter broccoli, not forgetting the purple sprouting broccoli, cabbage January King and cauliflower. Maincrop potatoes must be planted, and soil must be drawn up over the early potatoes if the tops are showing through the soil. Altogether it is a busy but a very interesting month.